IF WAR CAME NEXT WEEK

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FLYING

JUNE 1948 • 25 CENTS

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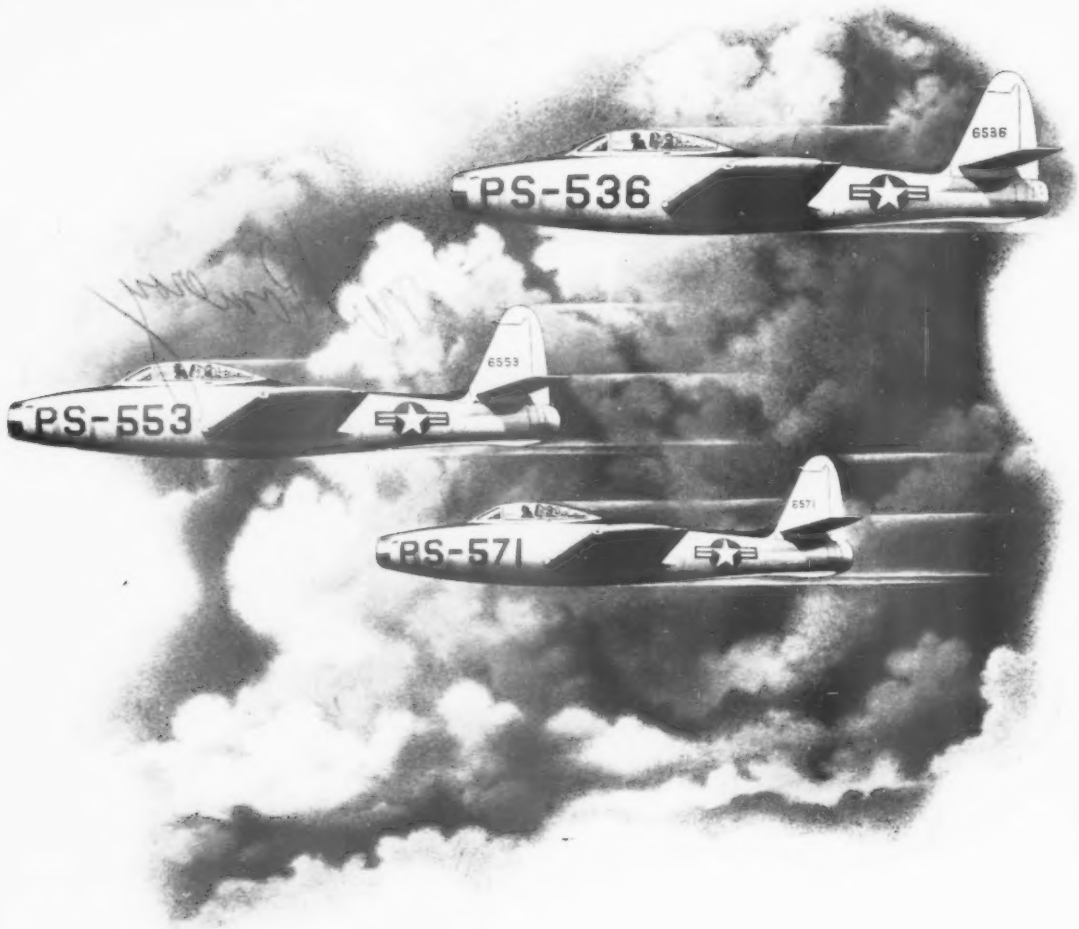

PROVEN IN SERVICE . . .

Worthy successor to the mighty THUNDERBOLT . . . the new P-84 THUNDERJET now being flown by two famous groups of the U.S.A.F. . . . the 14th, based at Dow Air Force Base, Bangor, Me., and the 20th at Shaw Air Force Base, Sumter, S. C., are daily demonstrating the high efficiency of this, the latest jet fighter on active service. ¶ Soon other groups will be equipped with this 600 MPH THUNDERJET. We are indeed gratified that the close co-operation between the U.S.A.F. and REPUBLIC's skilled design and production personnel has resulted in the development of another great combat plane for the security and protection of our nation.

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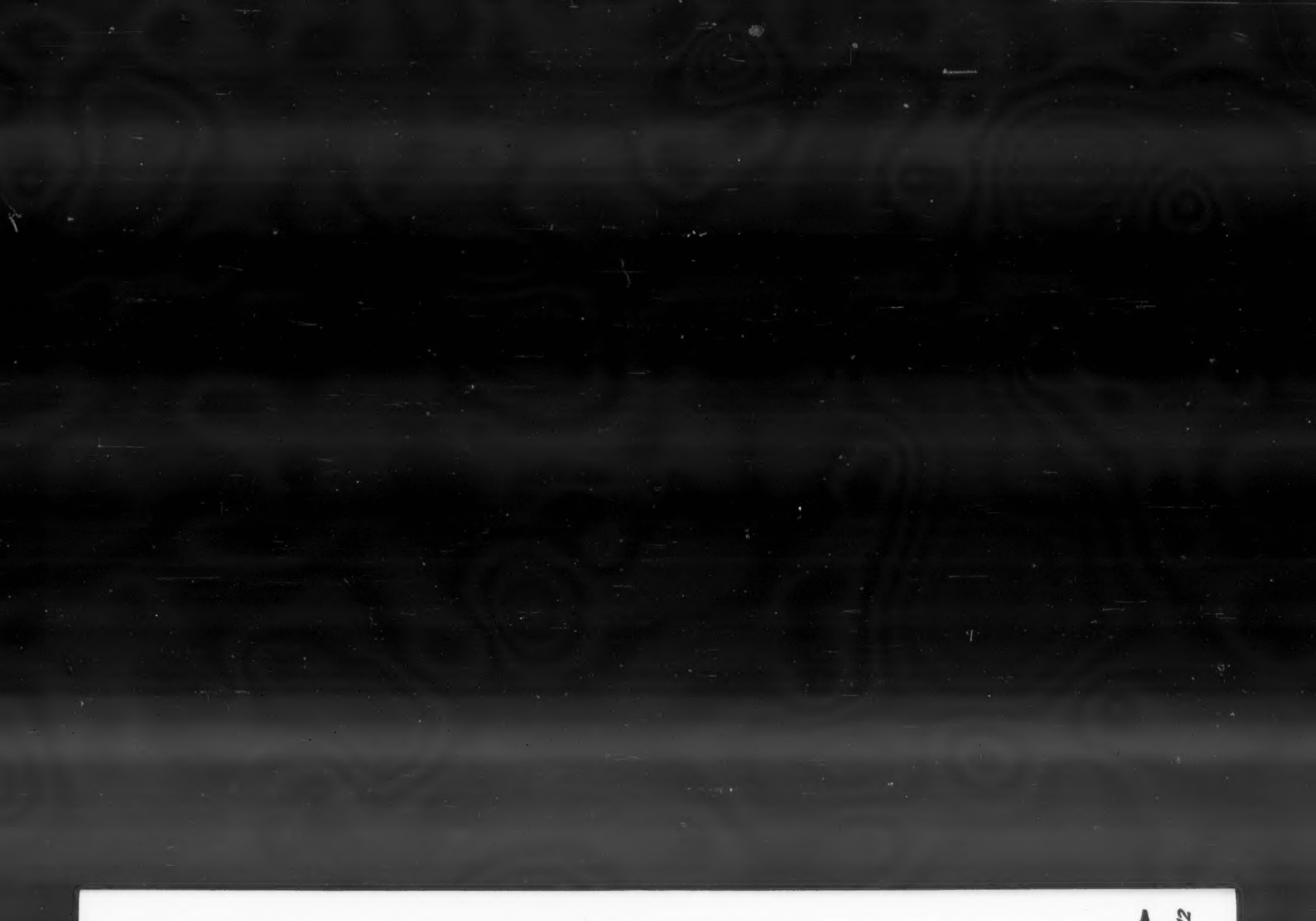

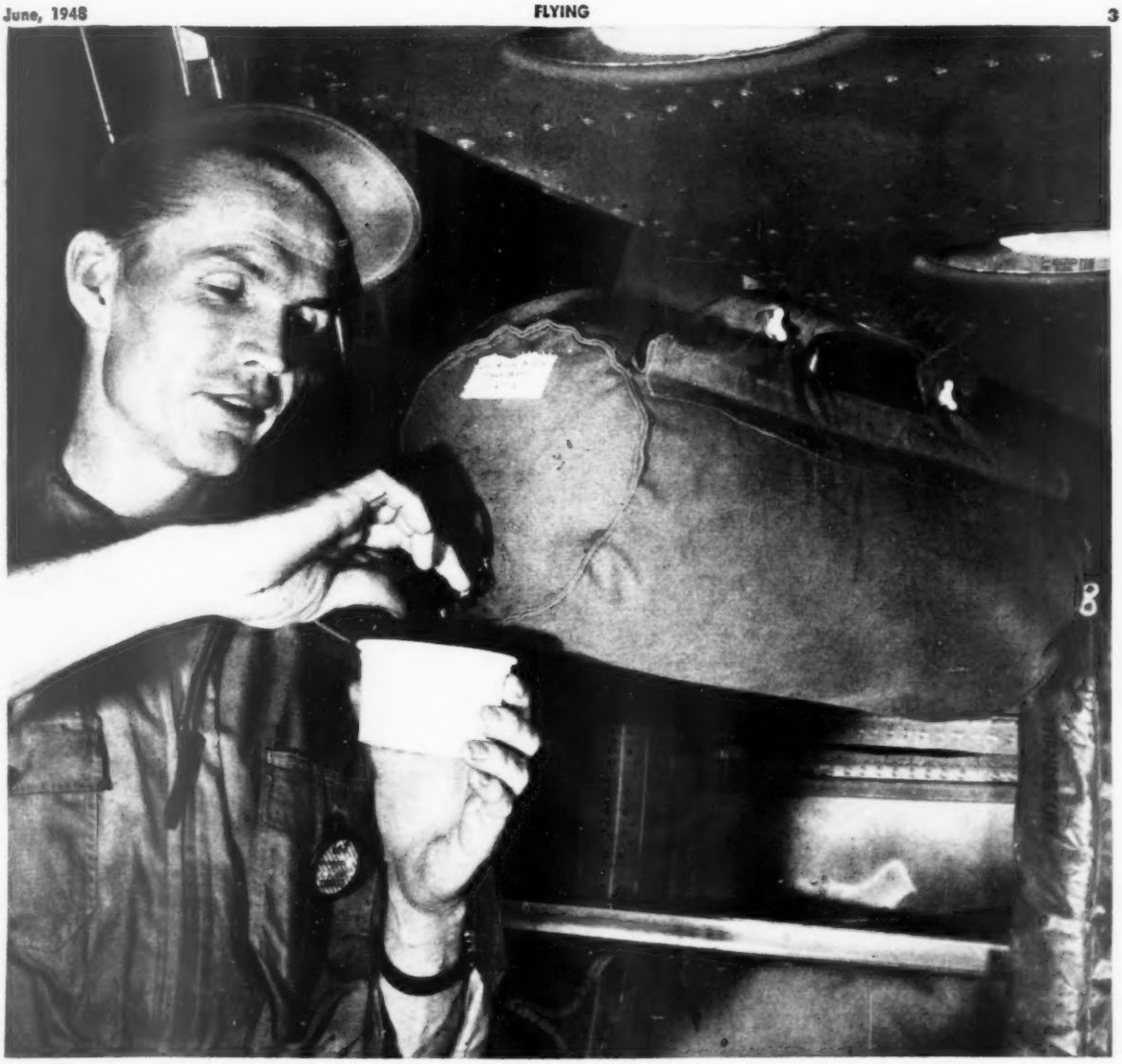

This bag helps water travel light

For maximum bomb and fuel capacity, designers of Convair's 139-ton B-36 wanted to trim every possible pound off its gross weight. One problem was to find a new material for the drinking water tanks—lighter than the metal used for standard tanks, yet strong enough to carry the load.

B. F. Goodrich engineers tackled the job. They found that light, tough Koroseal flexible material made an ideal water bag—carrying all the water needed for the 14-man crew at only one-seventh the weight of a metal tank!

There were still other advantages in using Koroseal flexible material. It doesn't affect the taste of the water as many tank linings do. It does not corrode. It is permanently waterproof. And it is tough enough to withstand severe sloshing effects. Koroseal water bags are now standard equipment on the B-36.

Carrying drinking water is only one of the many aviation jobs which Koroseal flexible material does so well. Its special properties have been put to good use in aileron seals, garbage bags, seat back bladders, and as flame-resistant coating for materials used to line baggage compartments and pilot's cabins.

Koroseal flexible material was developed by B. F. Goodrich engineers. Their constant research has steadily improved it. And they are continually finding new, important applications. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

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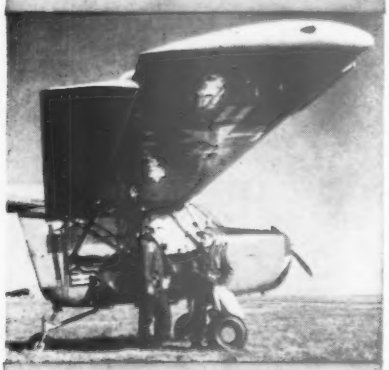

THE COVER: Boeing XL-15, Army Ground Forces liaison plane. Photo by Ross-Pix.

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"Very definitely, it is not an exaggeration to state that our company believes that air freight can revolutionize merchandising."

This statement is taken from the testimony of the General Traffic Manager of a large mail-order firm given before the Civil Aeronautics Board.

It comes as the result of proved success in using air freight to save costs on interest-in-transit, inventory-in-transit, swifter turnover of stocks, and the value of being first in a community with newest products and styles.

Here at Douglas we also believe in the growing future of air freight. And we are working with the air carriers and the shippers to lower air freight costs and to step up efficiency of operations.

Right now we are working on a freight version of the huge Douglas DC-6. This giant plane will, for example, carry up to 30,000 lbs. of payload. It will cut to 8 hours the flying time between New York and Los Angeles. New methods of handling and stowing cargo aboard the DC-6 also will be tested with individual air carriers.

Until the DC-6 enters service, freight versions of the Douglas DC-4 and DC-3 continue to carry the bulk of all air freight throughout the world.

Donald W. Douglas

PRESIDENT
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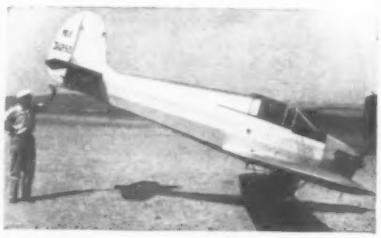
THE MAIL BOX

HOME-BUILT AIRCRAFT

As of March 27, 1947, the Civil Aeronautics Administration policy with respect to NX and NR certificates was modified in several respects. Part One of Safety Regulation Release No. 236, dealing with home-built aircraft, is very interesting and encouraging. All home-built aircraft will be



considered experimental and on satisfactory inspection will be issued NX certificates upon request to the local inspector. This procedure does not, however, include the home-built or assembly of aircraft made to standard designs from kits furnished by a manufacturer. Neither does it permit operation of aircraft which were originally approved models but have been repaired or altered in an unacceptable manner.

This is indeed encouraging to the light-plane enthusiast. For many years the majority of home builders living in Oregon have been trying to bring about this change in regulations. In August, 1947, I saw one of those home-built aircraft flown at the Norwood, Mass. airfield. It was a small low wing, single-place aircraft of 65-h.p., built by George Bogardus of Troutdale, Ore. (See photo above). The plane performed better than any plane of the same h.p. that I have ever flown. Take off was in less than 100 feet. Slow flying and gliding speeds were similar to a sailplane's performance. Wing loading was about five pounds to the square foot, in my opinion.

ED FARRELL

Dorchester, Mass.

FLYING HOODLUMS

In the article "Pennsylvania Tackles the Flying Hoodlum" (March issue) the part that struck me most forcefully was the accident figures on the period from January to June, 1947, when an average of almost three fatal crashes and 15 crashes of all kinds occurred every month. That, to a novice pilot, is very disconcerting.

The "New York Times" recently carried an article by Jerome Lederer, former head of the Safety Bureau, CAB, in which he stated: "The accident rate in personal flying is not of a magnitude that the public would accept if it knew how bad it was. It is the reverse of the airline picture, where the accident rate is good, but the public looks askance." He said that 50 per cent of all fatal private plane accidents resulted from stall spins. Another 25 per cent was due to reckless flying. These are nation-wide figures.

I have only been flying a few weeks but have already seen enough boneheadness among supposedly competent pilots to make me hold my breath when anyone does anything in an airplane except fly a good 3,000 feet above terra firma.

When, as shown in your airport survey, experienced and supposedly intelligent operators run an airport as sloppily and as carelessly as they do, it's time private flying stood back and took stock of itself. It will have to produce safer planes with more efficient maintenance if it wants to go beyond the "diaper" stage.

PAUL GREASER

Ithaca, N. Y.

SKYWAY SIGNPOSTS IN OREGON

Enclosed is a clipping from the "Oregon Journal" with a helicopter photo (shown below) of one of 76 air markers in the state of Oregon.

This clipping and letter are sent in protest to the remarks of George E. Anderson in his article "This Is Private Flying" (December issue). He should realize that we on the west coast, for defense purposes, obliterated all markers that would aid the enemy in time of war. Now that the war is over it is taking time and money to replace markers that will aid the private flyer.

The state of Oregon is also registering all

pilots for a fee of $1 per year and this money is set up in a special fund to be used for air search and rescue work.

FRED VINTON

Portland, Ore.

USED PLANE OWNERS

Your series of articles "This Is Private Flying" undoubtedly factual as far as they go, are not at all representative of average conditions. I have been unable to get any accurate figures, and am willing to be corrected if I err too far in my estimate, but I believe it is a safe guess that only about

(Continued on page 84)

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. . . **A seaplane base** in Oklahoma has been set up by Spartan School of Aeronautics, Tulsa. It will be on Grand Lake, a big artificial lake in northeastern Oklahoma. The seaplane operation will be run in connection with Spartan's flight school branch at Miami, Okla. Beginning students will use a Piper J-3 on floats.

. . . **A Los Angeles-Miami race,** with a $1,500 purse for the winner, will highlight the second annual All-Woman Air Show, June 1 to 6, at Amelia Earhart Field, Miami, Fla. It is sponsored by the Florida Chapter of Ninety-Nines, international organization of woman pilots.

. . . **Motorola's aviation radio** program has been bought by Don Mitchell, designer of the Motorola Airboy, Airboy Senior and Avigator, who now has his own company, Mitchell Industries, Inc., at Mineral Springs, Tex. Mitchell proposes to produce a new line of VHF aircraft radios, and will manufacture a 60-pound collapsible motor scooter, which he hopes will be carried in larger personal planes to solve the airport transportation problem.

. . . **Rain-making** is now a business. A new weather-making company, called Weath-Air, Inc., has been established in Los Angeles by Paul Mantz, race pilot. Two surplus planes, a North American B-25 and an Avenger, are equipped to scatter silver iodide, dry ice and charcoal over various cloud formations to make both rain and snow. Weath-Air will contract to produce artificial precipitation anywhere in the country.

. . . **"The Wright Way"** is the name of Skyway #1 from Los Angeles to Washington in honor of the Wright Brothers.

. . . **One of few deaf pilots** in the United States, Cecil Claxton of Rochelle, Ill., is qualified to fly any single-engine, land-based craft on flights not requiring radio contact. His license is the only one of its kind in Illinois. Airport officials say that Claxton's remarkable sense of balance helps overcome his deafness. He has logged more than 300 hours of official flying time.

. . . **A new Sikorsky helicopter** for use on aircraft carriers, battleships and cruisers is undergoing tests. It will have all-metal blades which lend themselves for de-icing, rather than the conventional metal-framed ones. A hatch in the cabin floor will make air-sea rescues easier and will facilitate cargo loading by permitting installation of a hoist. Blind flying instruments have also been installed. It will have a maximum rate of climb of more than 1,000 f.p.m. and will have a top forward speed of 110 m.p.h.

. . . **A 175-pound jet engine** for lightplanes and high-speed target drones is being developed by West Engineering Co. from the war-time Type B supercharger used on Army bombers and fighters. The company has purchased 6,000 of the superchargers from surplus. At present the units are turning out 280 pounds of thrust on tests, but West says the units should soon be giving 400 pounds thrust. This power would give the average lightplane, with one jet for a two-place job and two jets for a four-placer, a top speed of 360 m.p.h.

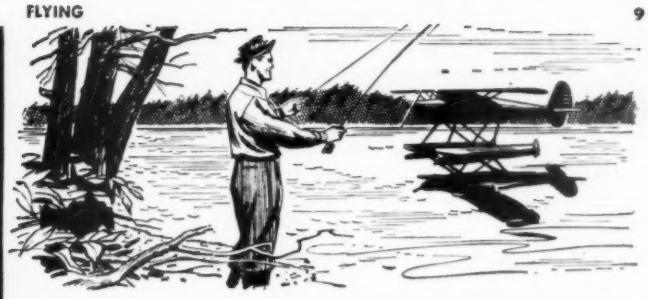
. . . **New CAB member** Harold A. Jones, a Marine Corps pilot in World War I and holder of the Navy Cross, will serve the

remainder of the six-year term of Col. Clarence M. Young, resigned, which expires December 31, 1952. (See photo above.) Jones is a graduate of Yale and received his law degree from Ohio State in 1923. From 1927 to 1928 he served as a U. S. special assistant attorney general and the following year became deputy district attorney of Los Angeles. For several years he has been senior partner in a Los Angeles law firm. During World War II he was a major on active duty with the U. S. Marine Corps.

. . . **GCA** will be installed at eight major U. S. airports during the next 24 months. A contract for the production of the improved equipment has been awarded to Gilfillan Bros., Inc., Los Angeles, by the CAA. First installation will be made at Los Angeles Municipal Airport with succeeding units scheduled for Cleveland, Atlanta, St. Louis and Boston. The new equipment will also be installed in Washington, D. C., New York and Chicago to replace the present war-time GCA equipment loaned by the U. S. Air Forces a year ago.

Standard of California's

PLANE FAX

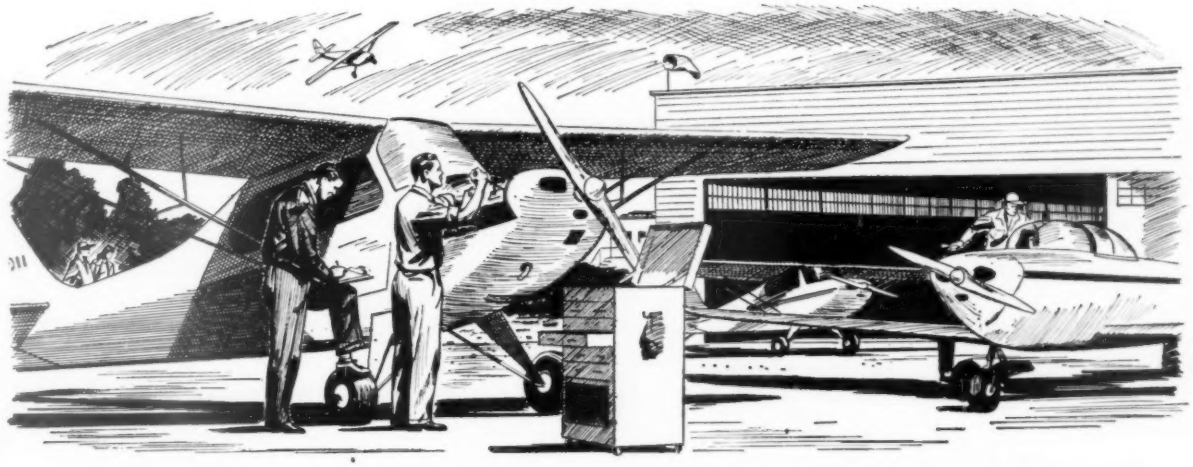


A page of service tips for private flyers and fixed-base operators

"RPM" cuts overhauls for Graham-Bell Aviation

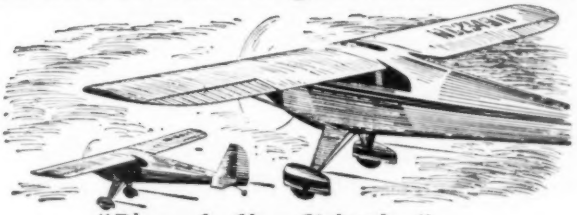
M. F. Downer, manager of Graham-Bell Aviation Service, Albuquerque, N. M., reports greatly reduced maintenance costs since switching to RPM Aviation Oil and Chevron Aviation Gasoline. He says, "We had considerable trouble with 65 HP engines suffering from sticking valves and bad rings . . . had to pull major overhauls at about 250 hours.

"We began using RPM Aviation Oils entirely. In checking the log books, we found one new engine had run 738 hours . . . another had the first top overhaul at 804 hours, and one of the original engines which was overhauled at 160 hours has been running without trouble for 558 hours." Mr. Downer added, "From these facts and figures . . . I know Standard Oil products have given us excellent results, for which I am truly grateful."

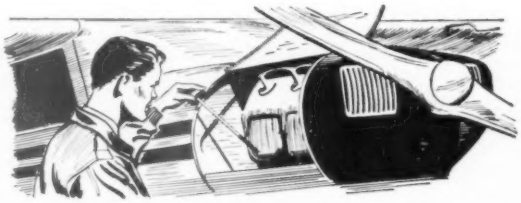


How to prevent stiff controls at high altitudes

In many instances, flyers find that aircraft controls stiffen at high altitudes. This is often due to the tendency of ordinary greases to become hard at low temperatures. That's why Standard of California has specially developed RPM Aviation Grease No. 1 to prevent it from stiffening in cold weather, yet stick to exposed parts at high speeds.



"Play safe - file a flight plan"



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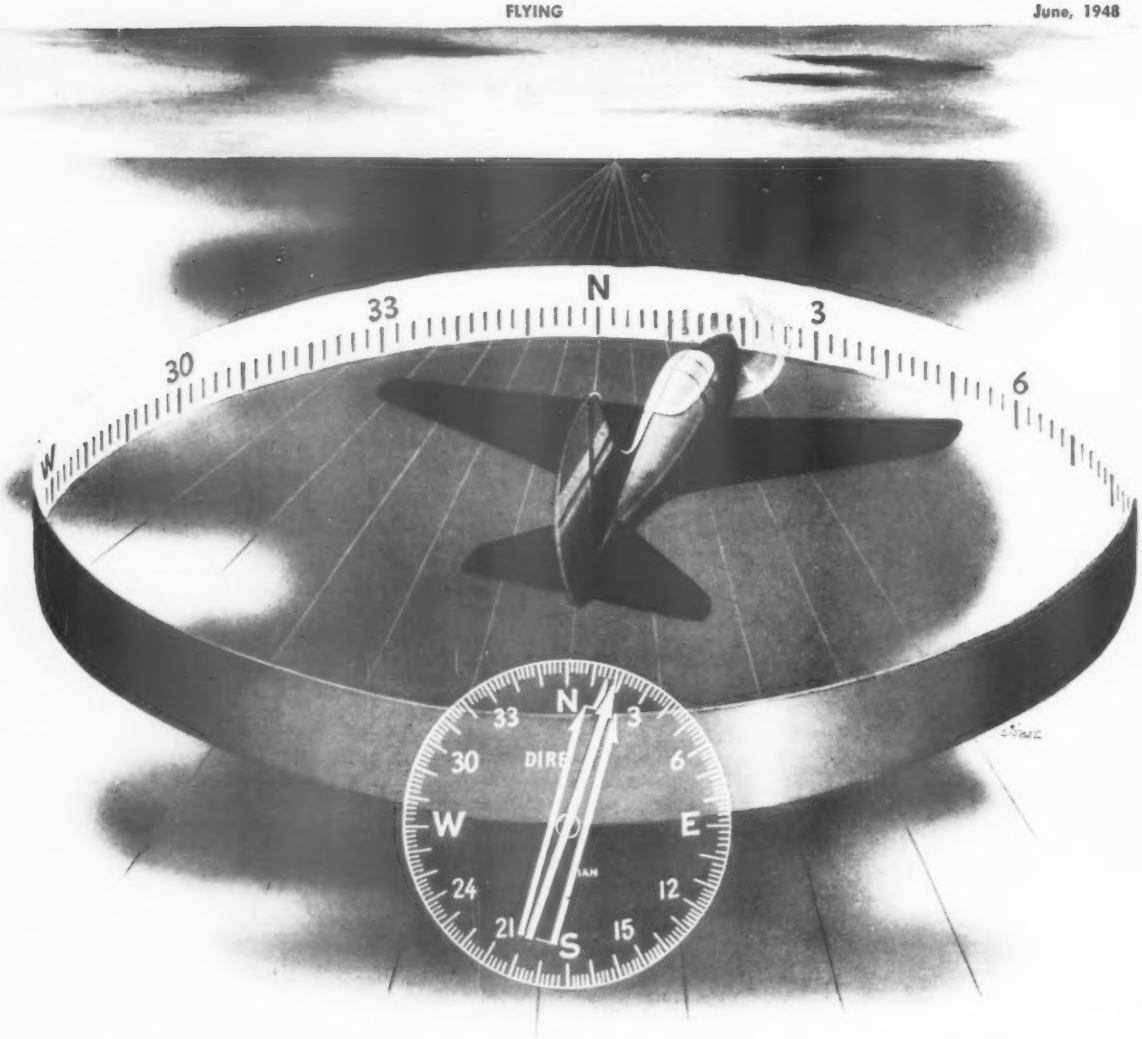

A Compass that Actually *Points!*

The flight-like indication of the new Kollsman Direction Indicator achieves a new realism in compass indication which has won the enthusiasm of many pilots. It exposes an entire 360° compass rose to view while its needle points the direction in which the plane is heading. Further, an index pointer is included which can be set to the desired compass course. The pilot thenceforth has only to keep the pointers matched. This new instrument is typical of Kollsman's continuous effort to make flying easier, more exact, safer . . . thereby increasing the utility and effectiveness of the airplane.

Write today for the illustrated folder describing the Kollsman Direction Indicator. Kollsman Instrument Division, Square D Company, 80-08 45th Avenue, Elmhurst, New York.

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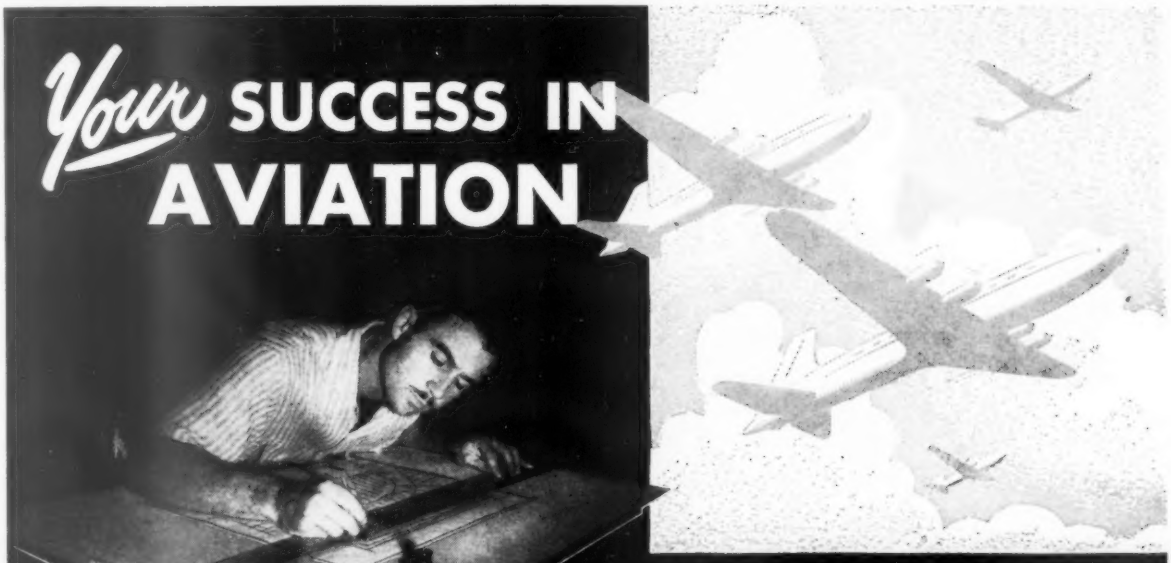

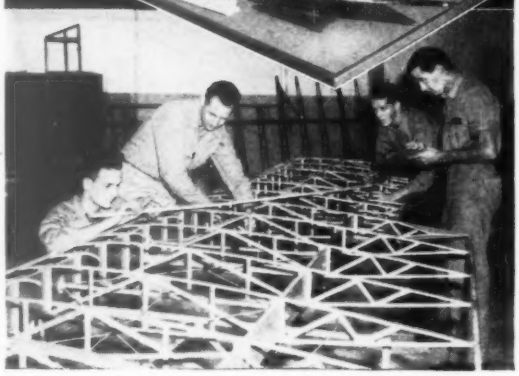

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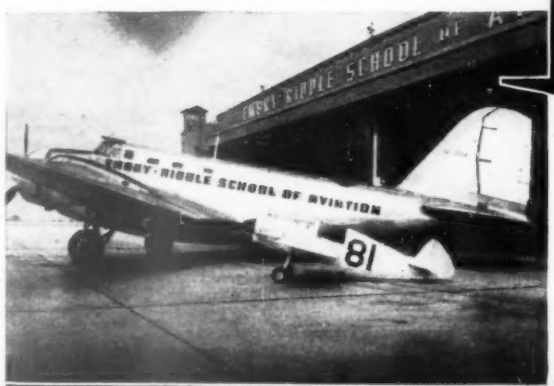

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At the airport, talk with any Bonanza owner. You'll know him by that proud, almost parentlike gleam in his eye! Ask him about the remarkable quietness of the cabin, and its economy, and all the claims that have been made for the revolutionary new Beechcraft Bonanza.

● A note on your company letterhead will bring an informative brochure on "The Air Fleet of American Business". Write today to Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

Tom G. Dillingham
INSURANCE and BOND SERVICE
BASS BLDG. PHONE 4111
ENID, OKLAHOMA

MR. WALTER H. BEECH
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS

MARCH 1, 1948

DEAR SIR:

I THOUGHT YOU MIGHT BE INTERESTED IN THE WAY I AM PUTTING MY NEW BONANZA TO BUSINESSLIKE USE.

I HAVE ALREADY MADE SEVERAL LONG CROSS-COUNTRY TRIPS IN IT AND HAVE FLOWN IT OFF HIGH ALTITUDE FIELDS IN PRACTICALLY ALL WEATHER CONDITIONS. I AM MORE THAN PLEASED WITH ITS PERFORMANCE AND FLIGHT CHARACTERISTICS.

FOR SEVERAL YEARS I HAVE COVERED QUITE A TERRITORY IN THE SELLING OF INSURANCE AND ADJUSTMENT OF INSURANCE CLAIMS. I AM NOW COVERING ABOUT THREE TIMES THE TERRITORY I DID FORMERLY AND I AM NEVER AWAY FROM HOME OVERNIGHT. I USED TO BE GONE TEN DAYS OR TWO WEEKS AT A TIME. I FIND I CAN GET INTO ANY FIELD THAT ANY OTHER AIRPLANE CAN, AND IN SMALL TOWNS WHERE THEY HAVE NO FIELDS, I USE A SMALL PASTURE, ACCOMPLISH MY BUSINESS AND LEAVE WITHOUT ANY LOSS OF TIME.

I ALSO OPERATE RANCHES IN COLORADO AND NEW MEXICO AND USE THE PLANE TO COMMUTE BETWEEN THEM, MAKING THE TRIP EACH WAY IN ABOUT TWO HOURS WHEREAS IT TAKES TEN OR TWELVE HOURS OF HARD DRIVING IN AN AUTOMOBILE.

THE BONANZA IS CERTAINLY MY IDEA OF EFFICIENT TRANSPORTATION, AND IT IS ONE OF THE BEST BUSINESS INVESTMENTS I HAVE MADE FOR A LONG WHILE. IT IS SO FAST AND ECONOMICAL THAT IT ACTUALLY PAYS ME A PROFIT ON ITS OPERATION.

YOURS VERY TRULY,
Tom G. Dillingham
TOM G. DILLINGHAM

INSUROR
MEMBER OF THE NATIONAL ASSOCIATION OF INSURANCE AGENTS

Top speed, 184 mph
Cruising speed, 172 mph
Range, 750 miles

BEECHCRAFT
BONANZA
MODEL 35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

FLYING
JUNE • 1948

Aviation's Race Against Time

By Brig. Gen. A. A. KESSLER, Jr.

Director of Procurement and Industrial Planning, Headquarters, U. S. Air Force

IN any future emergency TIME will be the vital and determining factor perhaps the difference between victory or defeat.

That is the controlling thought behind the air industrial planning program backed by the Air Coordinating Committee, top Federal aviation group, and the Munitions Board.

The Committee believes that Air Force and industry should immediately team up to develop specific plans for certain air weapons to insure their rapid production in case of war. Resources should be surveyed and earmarked, and all related activities synchronized with current military operations and strategic plans. Industrial preparedness is required for rapid production of all air materiel, including conventional aircraft and equipment as well as jet, pilotless, atomic or any other air weapons.

The plan is based on a recognition of the errors we made before World War II.

In 1939, actual expansion in the aircraft industry began with increased production to fill French and British orders. At that time, the American aircraft industry consisted of a "handful" of plants with limited equipment—a group of people building airplanes by hand, using job-shop methods.

In June, 1940, U. S. aircraft builders got "go-ahead" instructions for World War II production, following the President's announcement of the "50,000 Plane Program." But this goal was related neither to actual orders for specific planes, nor to the projected capacity of the manufacturing aircraft industry, which was then producing at an annual rate of 6,000 military planes (nearly half of which were trainers). At the time of Dunkirk, production was at an annual rate of only 20 million airframe pounds, or *one-fiftieth* of the annual production eventually required.

By Pearl Harbor, approximately one and a half years later, production had increased six-fold to some 120 million airframe pounds annually. During the year leading up to the invasion of North Africa, production tripled. In the next 18 months (immediately preceding Normandy D-Day) there was another three-fold increase. In the record year 1944, 96,000 military airplanes were built, with an airframe weight of over 1,000,000,000 pounds.

Certain facts from the World War II experience stand out:

A. The average time lag from Government go-ahead on a plane model until volume production was three and one-half years.

(Continued on page 70)

If WAR Came Next Week

Lockheed P-80Bs of First Fighter Group are winterized and equipped for the type of Arctic operations they would face in a future war.

Bombs on Pittsburgh! If that bulletin flashed over the radio, what would the U. S. Air Force be able to do about it?

UNSEEN and unheard, three enemy bombers arrive at midnight five miles above Pittsburgh's smog blanket. Radar gives them a clear picture through the artificial soup, and the Golden Triangle is a perfect reference point on their scopes.

The blasts brighten the city beyond its clearest day. America's steel center is blinded, then paralyzed. The flow of metal for factories, pipelines, trucks, aircraft, oil wells, railroads, guns, engines, ships, hangars, runways is halted.

War!

The thunder from Pittsburgh drowns out the brawling in Washington. There, as seven years before, Congress and the Executive branch have been fighting over which service should get what—and how much.

Suppose this happened next week. Where would we stand? What could our air forces do?

There is never enough of anything except confusion. There never is. But our air forces are far more ready to fight than in December, 1941—even allowing for the great strides in military aviation elsewhere in the world.

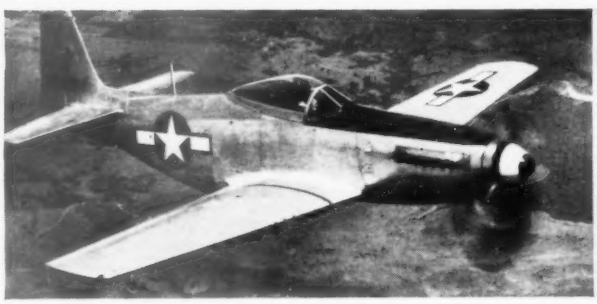
Many of the bombers and fighters look familiar to World War II airmen. But they have been modified, improved. So have fighting techniques. Training is far better. Bases are available. Combat aircraft are *(Continued on page 60)*

Convair B-36 has 10,000-mile range but is not yet operational.

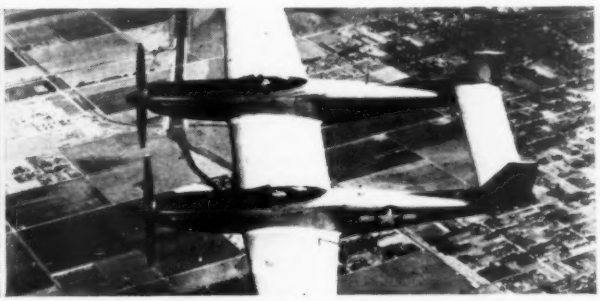
North American B-45 is first jet bomber to go into production.

Fairchild C-119B is advanced troop carrier and freight plane.

Boeing B-50 is heavy conventional bomber, not yet operational.



North American P-51 is obsolescent but is still widely used.



North American P-82 is only U. S. long-range escort fighter.

DEPLOYMENT OF THE U. S. AIR FORCE

(As of February 29, 1948)

CONTINENTAL UNITED STATES
- 11 Very Heavy Bombardment Groups
- 1 Light Bombardment Group
- 12 Fighter Groups
- 8 Troop Carrier and Reconnaissance Groups
- 8 Separate Squadrons

ALASKA
- 1 Fighter Group
- 1 Separate Squadron

CARIBBEAN
- 1 Fighter Group
- 1 Troop Carrier Group
- 2 Separate Squadrons

PACIFIC
- 1 Fighter Group

FAR EASTERN AIR FORCE
- 2 Very Heavy Bombardment Groups
- 2 Light Bombardment Groups
- 7 Fighter Groups
- 1 All Weather Group
- 2 Reconnaissance Groups
- 2 Troop Carrier Groups
- 5 Separate Squadrons

U. S. AIR FORCE IN EUROPE
- 1 Fighter Group
- 2 Troop Carrier Groups
- 1 Separate Squadron

TOTAL:
- **55 Groups**
- **17 Separate Squadrons**

Thirty-two plane groups, eight squadrons are based in the U. S.

Donald M. Stuart has BSC and EE degrees from the University of Minnesota, studied at the Bureau of Standards (graduate school) for three years. He joined CAA as radio engineer in 1934, is now director of the Technical Development Service.

Is "Omni" Best

YES

Says

DONALD M. STUART

IF you were one of the readers who took "What's Wrong With Omni-Range?" seriously, you must have reached the conclusion that the answer to the title question is "plenty." I have been given an opportunity here to discuss the question of "what's wrong with the article?". While vituperative journalism is not my forte, I hope to show that the answer here is also "plenty."

One wonders why such an outrageously inaccurate article should be written. An accurate presentation of the facts is the responsibility of good journalism, particularly in technical matters where the lay reader is not in a position to judge for himself. In searching for a motive behind the article under consideration, aside from the editorial sport of panning our Government and its responsible officials, one is led to the conclusion that it must be one or all of the following:

1. To provide income for the anonymous author.
2. To create the impression that the cause of the private flyer is being vigorously championed.
3. The author was used as a tool by interests having an axe to grind—or maybe something to sell.

The first is certainly understandable, although surely a writer can earn a living without being irresponsible. In the second, the motive may have been pure enough, but the result in this case has been contrary to the interests of the private flyer, as well as others in aviation, through misguided reporting. We suspect that the real culprit is described under (3) and that the author himself was guilty only of passing on to his readers without verification a host of misinformation which was given to him by engineers(?) and scientists(?) whom he erroneously assumed to be ethical professional people.

Before going into the matter of accuracy of the omni-range (VOR) and distance measuring equipment (DME), which are the radio facilities that comprise CAA's program of short distance navigational aids, let us consider the case of the average private aircraft owner and how he can benefit from this program. It is only fair to point out at once that the airborne part of the DME, as presently conceived and built, is far too expensive, complex, and heavy, to find any general use among operators of private aircraft.

Future development may bring this equipment within reach of private pilots but, for the present, it is out of the question. The airborne receiver for the VOR on the other hand will definitely be available for private flyers at a price they can afford to pay and at a *(Continued on page 52)*

The Pro and Con of "Omni"

The Civil Aeronautics Administration is planning to spend more than $25,000,000 installing omni-directional range stations on U. S. airways. Many scientists are extremely critical of this program, while the CAA strongly supports it. In the February issue of FLYING, *the editors presented the composite views of a number of scientists who oppose omni-ranges. The CAA asked space for a rebuttal. In the debate presented here, Donald Stuart supports the CAA view on omni-ranges. Stuart is a commercial pilot with 4,000 hours, most of which he has devoted to a critical testing of air navigation radio aids. Luis Alvarez, one of the scientists from whom* FLYING *obtained technical facts for its original story, was asked to reply to Mr. Stuart. The views presented here are of critical importance to commercial aviation because of the urgent need for better airway traffic systems.*

For Aviation?

NO

Says

LUIS W. ALVAREZ

Luis W. Alvarez is a Collier Trophy winner, invented GCA, designed and supervised construction of the versatile MEW radar, the first microwave beacons, the "Eagle" radar blind bombing set, and invented the proposed Tricon system of navigation.

THE omni-directional range *is* basically unsound!

The facts which I supplied to FLYING were checked by a dozen competent engineers and scientists, who agreed completely. But scientific arguments are not decided by counting the number of men or organizations on either side.

In a field like this, decisions should only be made after considering the technical, operational, and financial soundness of a proposed system. These are completely independent—an operational advantage may *outweigh* a technical disadvantage, but it cannot *eliminate* it.

For other reasons, the omni may be the best system for the present, *in spite of* its technical shortcomings. But it should not be argued that it is being installed *because* of its technical excellence.

My contention that the omni is basically unsound, and "violates" a basic law of physics has not been refuted. The substance of Mr. Stuart's reply is that, "we have tested it under normal conditions, and it works."

If an engineer designed an airplane identical to the DC-3, but held the wings on with 10 per cent of the bolts found necessary by Douglas to take care of violent "bumps," it would be evident that his design was bad. The number of hours the plane flew in smooth air without losing a wing would be an interesting piece of information but would have no bearing on the goodness or badness of the design. To evaluate airplane structures or radio navigational aids it is necessary to know how they work under the *worst* conditions. These are violent accelerations for planes, and bad weather plus unwanted reflecting objects for radio aids.

Mr. Stuart proves conclusively that the VOR (visual omnirange) has shown errors under two degrees. But I have always believed it could do even better, if placed at a good site, such as the center of a large lake. My objection to omni is not based on what it can do under *ideal* conditions, but rather on how it will work under *adverse* conditions, when tests are hard to run. When reflections are present, beams are bent, as pointed out several times in FLYING's original article.

This is the key to the controversy and it is regrettable that this point has been ignored. Mr. Stuart's article never mentions the word reflection nor even alludes to the subject!

The troubles experienced in a radio navigating system which is designed in disregard of the "antenna law" come almost exclusively from reflected radio waves. (This law, in its simplest form, states that the maximum angular errors in a system equal 57°, divided by the overall size of the antenna system in wave length units. It is a fundamental law, and even applies to systems which measure *distances* by radio methods, if the words are interpreted broadly. Three examples of reflection troubles will emphasize this point.

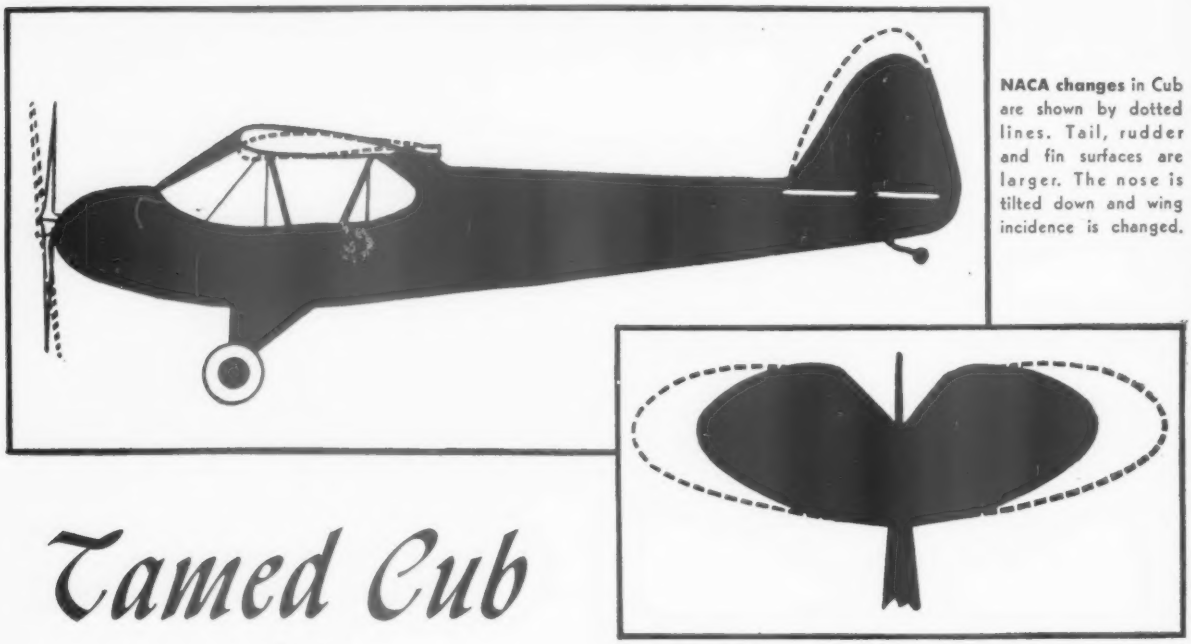
1. The A-N ranges have bent beams and multiple courses which have been responsible for many plane crashes, particularly in mountainous areas. Under the ideal conditions of the midwest plains no reflecting objects large enough to bend the long wave beams are present, so in these regions the ranges are relatively free of such troubles. It is instructive to note that in the field of radar, where the antenna law is taken seriously, the words "beam bending" are not a part of the technical vocabulary. No one ever bothers to flight test for angular errors in a properly designed radar installation because everyone agrees that errors greater than those predicted by the antenna law cannot be present, and these are small enough. On the other hand, a good part of the CAA technical effort goes into flight tests of beam systems to check their errors.

2. The Germans used an improved version of the A-N range to bomb blacked-out British cities in 1940-1941. To improve accuracy they used antenna systems six or more wave lengths wide. (The CAA's repeated assertion that this is not important is at variance with the actions of everyone else who has considered the problem. A layman with no technical knowledge would find it hard to believe that all radar designers—and this German group, the only other engineers to build a new type "beam system" in recent years—are "out of step" with the CAA.)

The RAF engineers, remembering that beam systems are susceptible to bends from reflected signals, reasoned correctly that they could bend the German beams if they produced "artificial reflections." So they set up low-powered transmitters in England, which bent the beams away from their cities and made the Germans drop their bombs in open fields.

3. Another CAA-sponsored radio aid which violates the antenna law and has therefore encountered serious trouble is the ILS glide path. In this, reflections from the ground are *purposely* used to increase the effective vertical length of the antenna system. It works well under ideal and even normal conditions. But when rain or snow fall, the reflectivity of the ground changes and the angle of the glide path can be drastically altered.

After this introduction to the subject of reflection troubles, or "terrain effects" as they are some- *(Continued on page 68)*



NACA changes in Cub are shown by dotted lines. Tail, rudder and fin surfaces are larger. The nose is tilted down and wing incidence is changed.

Tamed Cub

By
WILLIAM WINTER

NACA's modified lightplane is spin-proof, stall-resistant.

THE strange thing about inadvertent stall-spin accidents is that, for the past seven years at least, it has been possible to design and build planes that will not stall out of a turn and which cannot be intentionally spun with *any* setting of the controls, either power off or power on.

We are not referring to the two-control Ercoupe, the spin-resistant Stinson, or the few other pioneers who concede that low-altitude stalls and spins out of turns can happen to all pilots, regardless of their experience or technique.

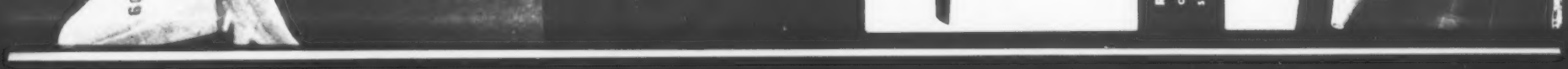
What is this remarkable airplane? Nothing but a familiar *Cub* with a handful of simple modifications.

Before the war NACA's Langley Memorial Laboratories began 20-foot spin tunnel tests on about 150 military aircraft. Many of these planes approximated in dimensions and mass distribution the typical personal aircraft. What the researchers learned about spins obviously could be applied to lightplanes—and in 1940-41 such measures were incorporated in a 50-h.p. *Cub* owned by NACA.

NACA's problem was tough. With a few simple changes in the aircraft (capable of application to all planes in service) and without radically altering the appearance of the airplane, NACA had to make it stall-proof!

The requirement that the plane's basic appearance not be altered seemed to prohibit adaptation to a fully-stall-proof airplane (how could a pilot make a three-point stall landing in a stall-proof airplane?). But *(Continued on page 66)*

Spin-proof plane retains same basic appearance but has new features. Cub can't be spun, power on or off, with any setting of the controls. Stick can be held full-back in turns without a stall. General flight characteristics aren't materially changed.



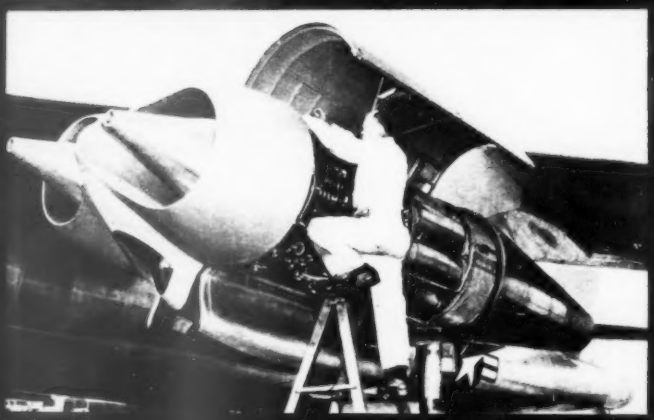
Swept wings, bicycle-type gear, and jet engines on underwing pylons identify XB-47.

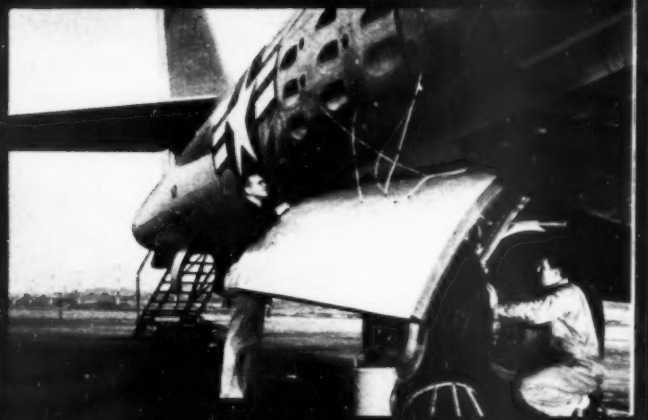
BIG JET

THE shape of planes to come is foreshadowed in the new Boeing XB-47 *Stratojet*, the world's first swept-wing bomber. Its six GE J-35 turbo-jets generate a total of 24,000 pounds of thrust. It also has 18 Aerojet JATO rocket motors of 1,000 pounds of thrust each for emergencies. The three-man crew sits in catapult-type ejection seats. Crew compartment is pressurized and refrigerated. Speed is "over 500 m. p. h." Span is 116 feet, length 108 feet, and height of tail 28 feet. Gross weight of *Stratojet* is 125,000 pounds.

Retractable leading edge slats (above) help XB-47 maintain lateral control at low speeds while big flaps help slow plane. Note easy accessibility of jets (below) which generate 4,000 pounds of thrust each.

Test pilots Scott Osler (left, above) and Robert Robbins flew XB-47 on maiden flight. Pressurized cockpit is refrigerated, has Plexiglas canopy. Nine JATO rockets (below) are recessed in each side of plane.





Eleven-word message can be sent easily with three symbols. Artist's conception of distress scene shows code signs for "All well. Require fuel and oil. Probably safe to land here." Pilots can acknowledge receipt of the ground messages by rocking plane's wings from side to side.

SIGNALS FOR SAFETY

CAA sign language for ground-to-air messages gives flyers 19 simple emergency-use symbols.

DOWNED FLYERS without radio once were in the unenviable position of mutes—without a sign language. They could flail their arms, which might mean anything from "Having a wonderful time; wish you were here" to "Injured: need doctor immediately." Or, if they were lucky, they could laboriously trace out a written message on the ground.

That's not necessary now. CAA's new code of 19 symbols, shown on these pages, covers almost every kind of emergency. Adapted from the Army, the code will be used universally—and can be of assistance not only to downed pilots but to isolated persons or communities temporarily cut off from communication by flood or other disaster. Symbols are simple; for example, the call for medical help is a single straight line, 10 feet long and about two wide, laid out to be visible from the air.

CAA suggests flyers memorize the code, so they can read it from the air, or use it if forced down themselves.

Panels can be fashioned from fabric, wood, stones or other available material. For best visibility, they should be *at least* 10 feet long, and of color that contrasts with the background against which they are placed. END.

Crew members signal from "crashed" plane in Labrador during a demonstration of air-rescue techniques. SOS symbol was fashioned out of spruce boughs, which contrast with snow. For other, more specific messages the flyers might have sent, note the CAA-prepared table below.

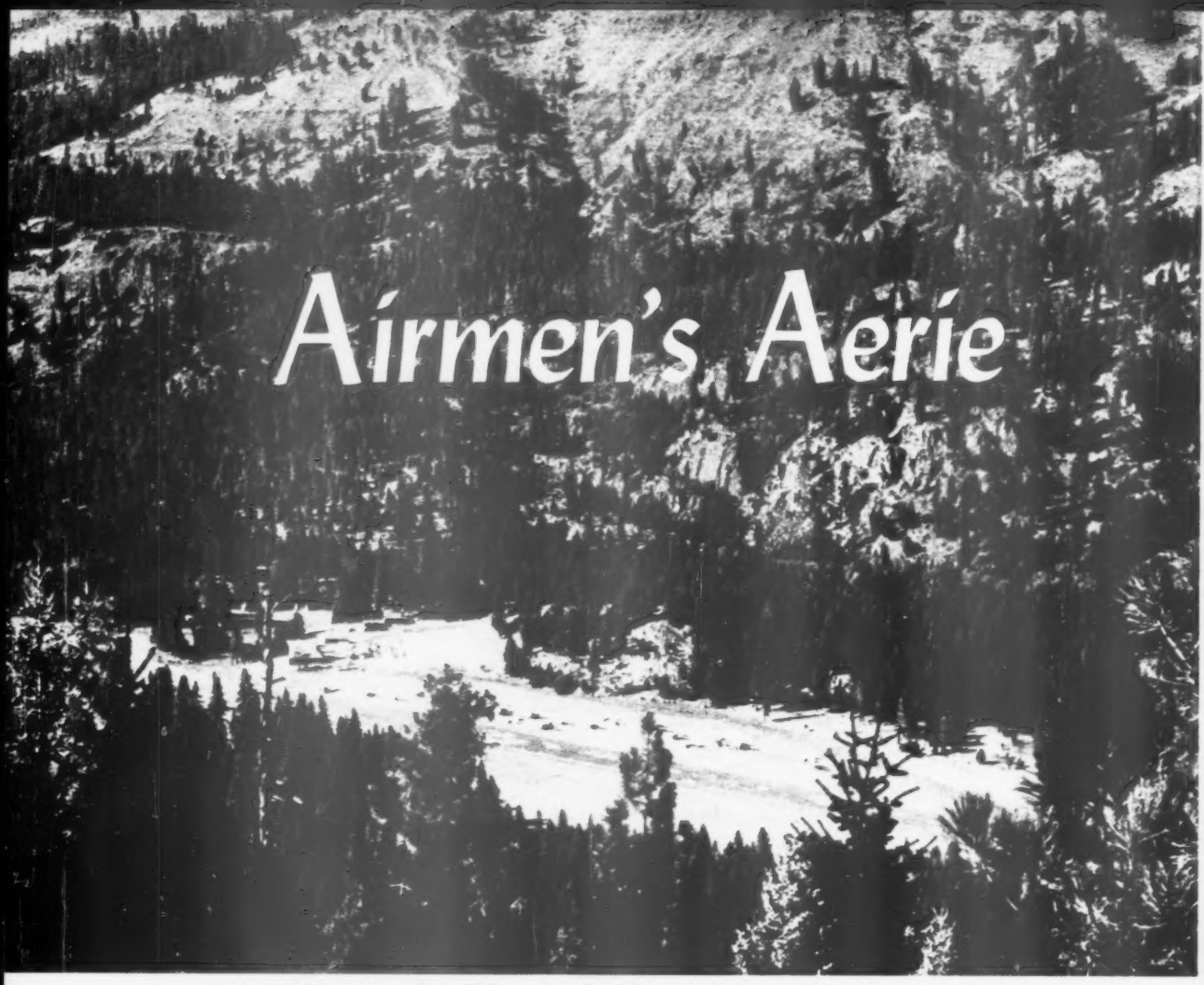
GROUND-TO-AIR EMERGENCY CODE

I	*Require doctor. Serious injuries.*
II	*Require medical supplies.*
X	*Unable to proceed.*
F	*Require food and water.*
V	*Require firearms and ammunition.*
□	*Require maps and compass.*
I	*Require signal lamp with battery, and radio.*
K	*Indicate direction to proceed.*
↑	*Am proceeding in this direction.*
▷	*Will attempt take-off.*
⌐	*Aircraft seriously damaged.*
△	*Probably safe to land here.*
L	*Require fuel and oil.*
LL	*All well.*
N	*No.*
Y	*Yes.*
⌟	*Not understood.*
W	*Require mechanic.*
SOS	*If in doubt, use international symbol.*

Instructions

1. Lay out symbols by using strips of fabric or parachutes, pieces of wood, stones or any available material.
2. Provide as much color contrast as possible between material used for symbols and background against which symbols are exposed.
3. Symbols should be at least 10 feet long or larger, if possible. Care should be taken to lay out symbols exactly as shown to avoid confusion with other symbols.
4. In addition to using symbols, every effort must be made to attract attention by means of radio, flares, smoke or other available means.
5. When ground is covered with snow, signals can be made by dragging, shoveling or tramping the snow. The depressed areas forming the symbols will appear to be black from the air.
6. Pilot should acknowledge message by rocking wings from side to side.

Airmen's Aerie



Hemmed in by 3,000-foot ridges, Red's Wallowa Horse Ranch has a single strip on which landing or take-off can be made only in one direction. Ranch is accessible by airplane or by a hard three-hour pack trip. Stream full of trout flows through valley.

Isolated dude ranch in Oregon mountain valley can be reached only by airplane or a hard pack trip.

By JOE VAN WORMER

DEEP IN the mountains of northeastern Oregon, Red's Wallowa Horse Ranch owes its existence to a strong interest in private flying and the urge to find a place that isn't overrun with people. It started when Jack Sanderson, a young Portland, Ore., businessman received his army discharge and returned home. The first thing he did was find his hunting and fishing partner, Red Higgins, and go deer hunting.

They tried several of their favorite spots and found them crowded with hunters. In two weeks they saw several hundred hunters but no deer. Jack and Red returned to Portland, a pair of unhappy sportsmen. They decided to hunt for a spot so inaccessible that nothing but the birds could reach it.

After several months of searching they found just what they wanted. It was a small valley deep in the Wallowa Mountains, 140 airline miles due east of Portland. It is a section of the state noted for its good hunting and fishing and for its rugged scenic beauty. On each side of the valley floor towers a ridge 3,000 feet high. The valley itself is 3,000 feet above sea level but the meadow is long enough for an airstrip.

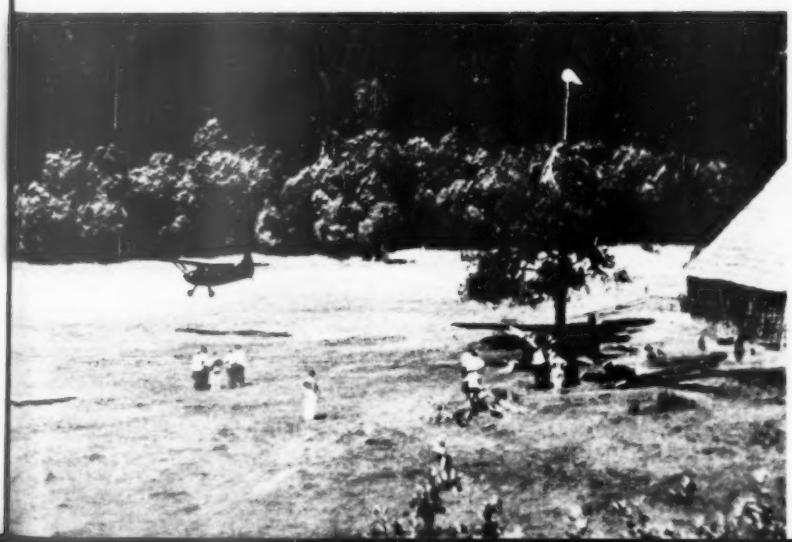
The nearest road ends eight miles away and it is a three-hour trip by pack train into the ranch. The Big Minam River runs through the property, its clear water full of unsophisticated trout anxious to be caught. The mountains around contain the largest herds of deer and elk in the state.

This looked like just the spot for these two outdoors enthusiasts. Sanderson had been flying since 1931 and saw the advantages of air transportation in and out of the mountains. Red had done enough flying to be equally enthusiastic.

Red, who is now co-owner and manager of the ranch, rounded up a string of horses and moved in. The buildings left by a former owner were in bad shape and required a lot of repair and remodeling. The meadow was leveled and filled and trees at the end of the runway were removed. Soon Jack was making regular trips in by plane.

Packing in supplies and repair materials was slow and tedious until a pilot with a tri-motored Ford was located. Every-

Breakfast flight scene last August shows diverse types of lightplanes which have used strip. Most equipment was flown in by tri-motored Ford.

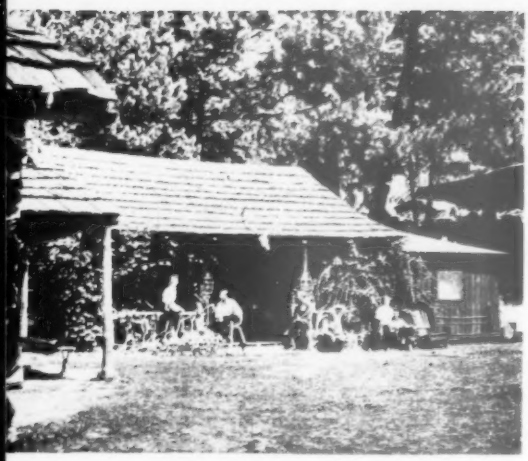


Voyager lands with a power-on approach (left) in typical mountain valley style. Welcoming committee (above) meets the daily supply plane which flies in fresh vegetables, mail, and other needed supplies.

Continued on the next page

Big Minam River flows past guest cabins at Wallowa Horse Ranch. Author is shown fly-fishing here. Limit catches of rainbows are taken from stream within a half-mile of ranch.

AIRMEN'S AERIE *continued*



thing from pipe to furniture was flown in and the airstrip became the most important piece of equipment on the place. With the supply problem licked, it wasn't long before the partners were ready for operation.

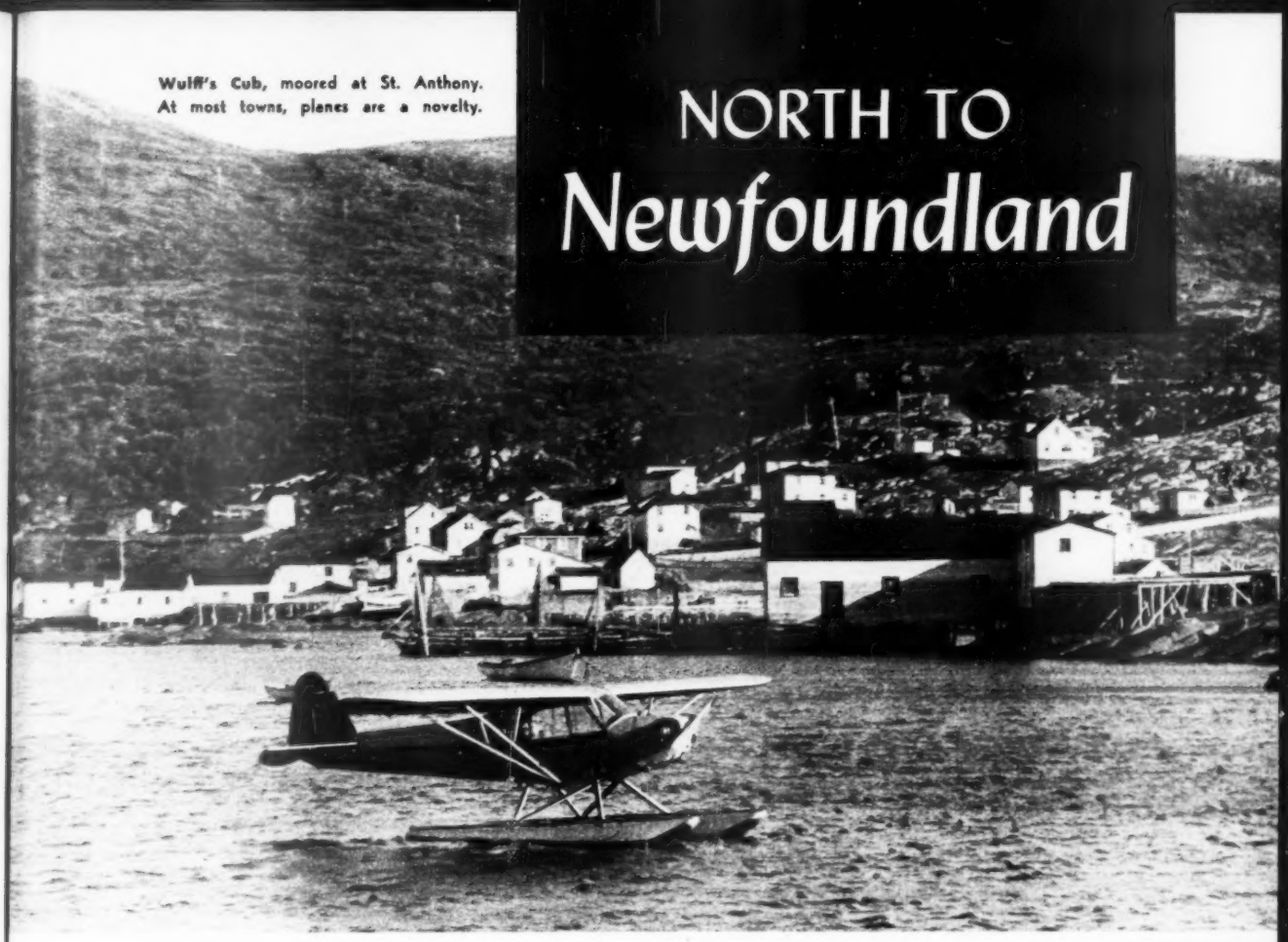
Original cost of the property was about $25,000 and an equal amount has been spent on new buildings and modernization. Red is active manager because Sanderson is busy with two large camera and photographic supply stores which he owns in Portland. They operate under the name of "Sandy's." The ranch is not operated during the winter time.

A few non-flying vacationists arrive by the rigorous three-hour horseback trip, but most of the guests come by plane. Pilots making their first flight into the Horse Ranch usually stop at La Grande or Baker, Ore., for directions and any gas they may need. There are no refueling facilities at the ranch. It is only a 20- to 30-minute hop from either of these towns, but it is advisable to consult the *(Continued on page 82)*

Main ranch house (above) has horns over roof from elk shot just over ridge last winter. Ranch guests line up (below) for typical hearty buffet luncheon.

Evening campfire gathering, that hallmark of western dude ranching, has special gusto in timber-rich Oregon. There is always plenty of wood to throw on the fire and guests draw close to the flames during the cool summer evenings.

NORTH TO *Newfoundland*



Wulff's Cub, moored at St. Anthony. At most towns, planes are a novelty.

How novice pilot flew a small seaplane to famed salmon area.

By LEE WULFF

Forty-two inch salmon is lugged from canoe into plane at Western Brook. Most of the author's fishing and flying was done solo.

EIGHTY MILES from Nova Scotia's northern tip and only nine miles from the mainland at Labrador lies Newfoundland, an island big as Pennsylvania. Since about 30 per cent of its surface is covered with water, it is exciting virgin territory for pilots on floats (or skis in season), but only one good airfield is open to civilian planes—Gander, major refueling stop on transatlantic flights. Seaplane pilots will find the fishing untouched and the scenery superb.

Aviation development in Newfoundland (which, incidentally, is not a part of Canada but a separate British colony administered from London) has lagged behind that in other North American areas. Anyone flying a seaplane to Newfoundland this summer will have an almost open field. Military planes have flown over every part of the island, but you'll probably be the first pilot ever to land at most of your stopping points.

With 50 hours and a two-week-old private pilot's ticket, five weeks after my first lesson, I took off (*Continued on page* 48)

Father and Mother Smith talk before Skytel which faces the runway. Hotel building has restaurant, lounge, tower on top.

New Smith hangar base on Lake Washington at nearby Renton offers both land and water operations. Smiths have 21 planes.

Kent Airport, as Smith pasture is now called, has single 3,000-foot runway. The farm's dairy buildings are at far right.

Smith clan gathers to help dad and mother plan a cross-country flight. Left to right are sons Howard (29) and Dan (27), Daughter Theresa (22), Mr. and Mrs. Smith, daughters Mickey (17), Virginia (30) and Irene (20), Son-in-law Mark (27), and Catherine (25).

THE FLYING SMITHS

By LORINDA MISKELL

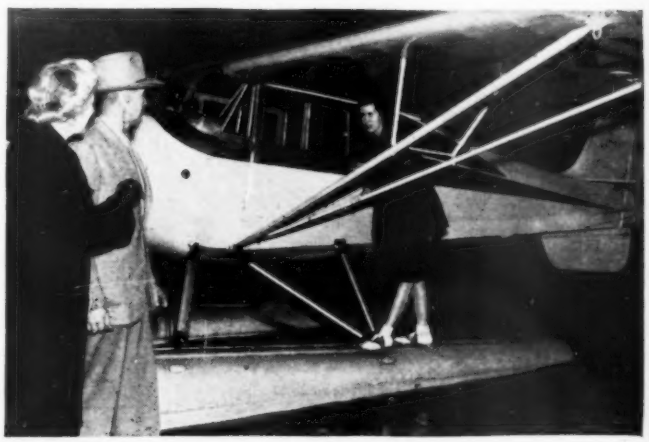
A cow-pasture strip started a busy fixed-base operation for the nine flying Smiths.

WHEN the Smith boys, Howard and Dan, bought an airplane and asked their father Ben if they could move the cows out of the east pasture so they could use it for a landing strip, he gave his permission.

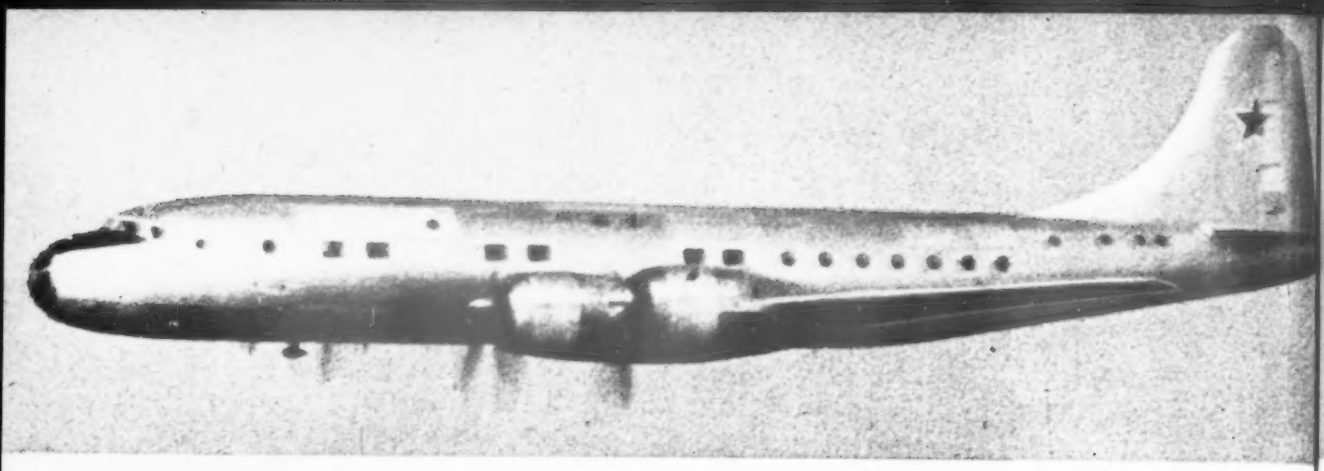
Father Ben Smith has turned into the greatest flying enthusiast of the family and takes a back seat to no one when it comes to handling the controls. In fact if anyone is looking for Dad between the hours of sunrise and sunset, after telephoning the dairy and the airport, it's just understood he's in the air. What's more, Mrs. Smith is probably with him. She flies in self defense. Though she doesn't have her private certificate, she has taken dual instruction and will probably be getting her ticket one of these days. Ben Smith, who is past 50, is president of the Western Washington Aviation Association. He holds his private certificate and his family can't see why he doesn't work toward a commercial.

The youngsters, five girls and two boys, were always into one thing and then another. Their father had helped them build a tennis court when they wanted it, and had let them put up a basketball hoop in the back yard. Clearing the pasture for the boys to shoot a few landings seemed just another order for the day. That was what he thought.

But Mr. Smith, who operates his own successful dairy farm, rapidly realized that he might as well cross the pasture off his list permanently. The 60-acre tract soon was well on its way to becoming one of the finest private landing strips in the Pacific Northwest. Nor did *(Continued on page 82)*



Mickey Smith, baby of the family, soloed at 16 and got her private license at 17. She recently won a school aviation contest.



Tupolev Tu-70 is a 72-passenger Russian transport which Boeing engineers say is unquestionably based upon B-29s seized by Reds. The nose and fuselage have been redesigned, but note similarity of rudder and fin of two planes. Tu-70 even has inverted camber of B-29 tail.

Russia Steals the Superfort

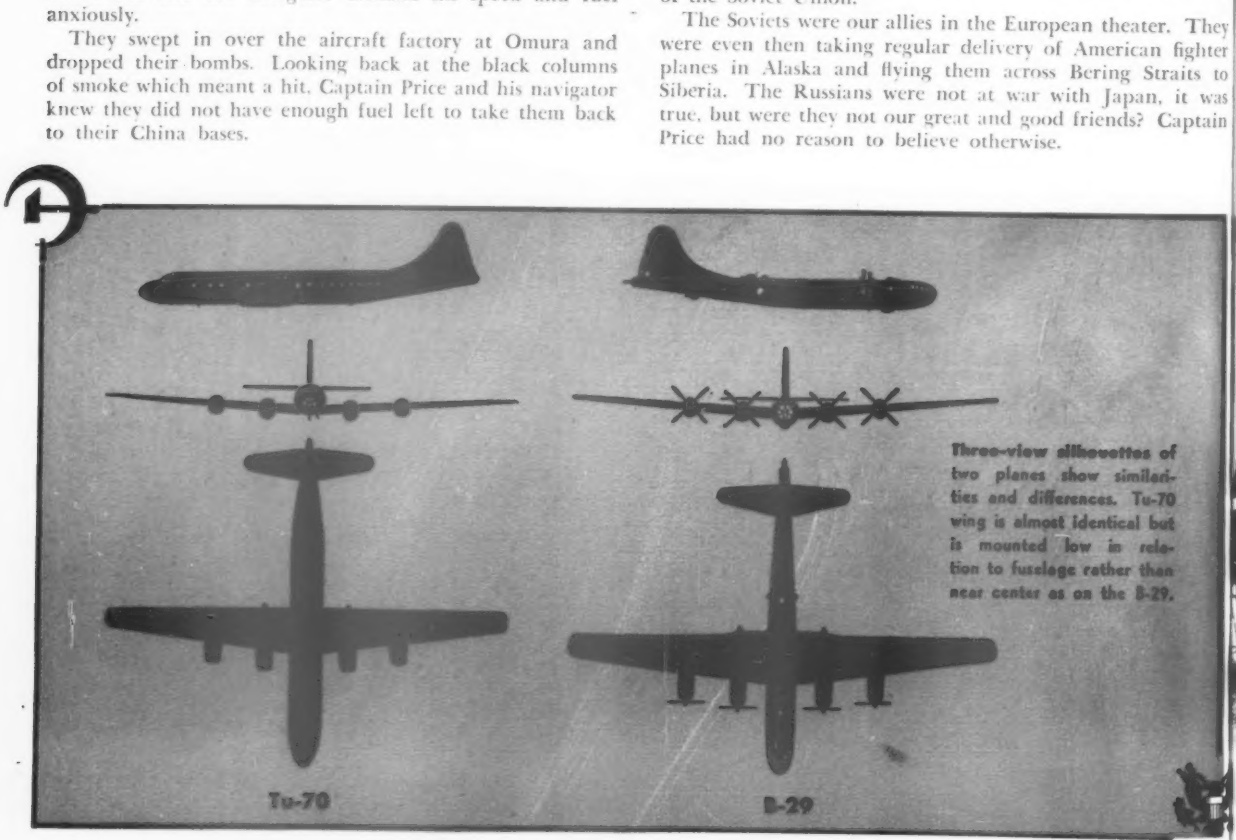
By KURT RAND

IT WAS Armistice Day, 1944. A flight of *Superfortresses* from inland Chinese bases were winging across the East China Sea heading for Japan. Among these planes was the *General H. H. Arnold Special*, commanded by Capt. (now Maj.) Weston H. Price. The big bomber was bucking headwinds and the navigator checked his speed and fuel anxiously.

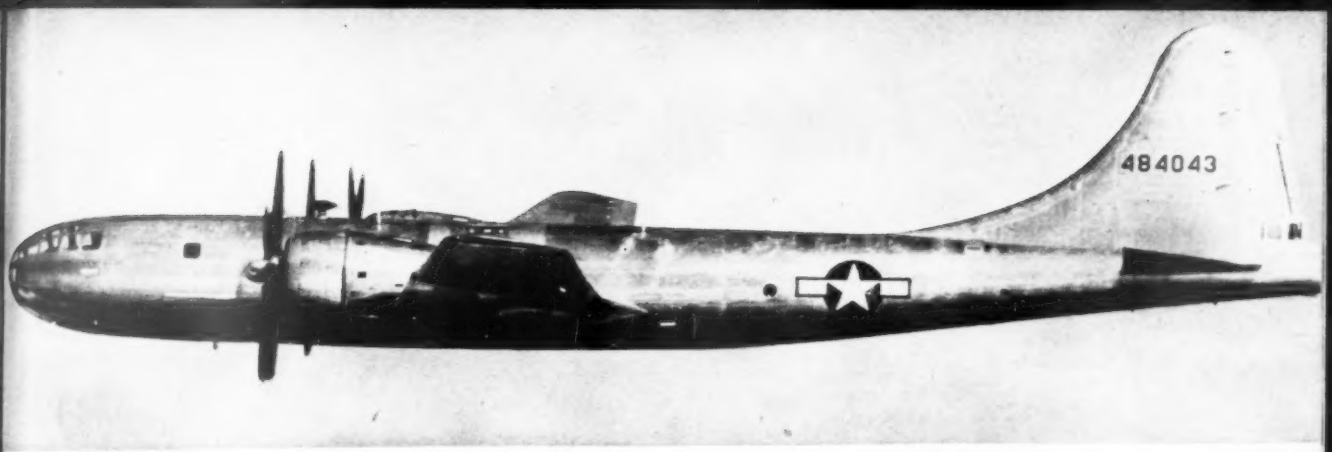
They swept in over the aircraft factory at Omura and dropped their bombs. Looking back at the black columns of smoke which meant a hit, Captain Price and his navigator knew they did not have enough fuel left to take them back to their China bases.

They had several alternatives. They could fly toward the new *Superfort* bases on Saipan, call up air-sea rescue en route, and plan to ditch their ship in mid-ocean, taking their chances on a good ditching and on being located and rescued. They could fly back toward occupied China and bail out, gambling that friendly Chinese would guide them to safety overland. Or they could fly to the friendly territory of the Soviet Union.

The Soviets were our allies in the European theater. They were even then taking regular delivery of American fighter planes in Alaska and flying them across Bering Straits to Siberia. The Russians were not at war with Japan, it was true, but were they not our great and good friends? Captain Price had no reason to believe otherwise.



Three-view silhouettes of two planes show similarities and differences. Tu-70 wing is almost identical but is mounted low in relation to fuselage rather than near center as on the B-29.



Boeing B-29 has slimmer fuselage than redesigned Tu-70 fuselage which is used for transport. Vertical tail and dorsal outline are the same on both planes. The rudder of the Tu-70 appears to end at what would be top of tail gunner's doghouse on the Superfortress.

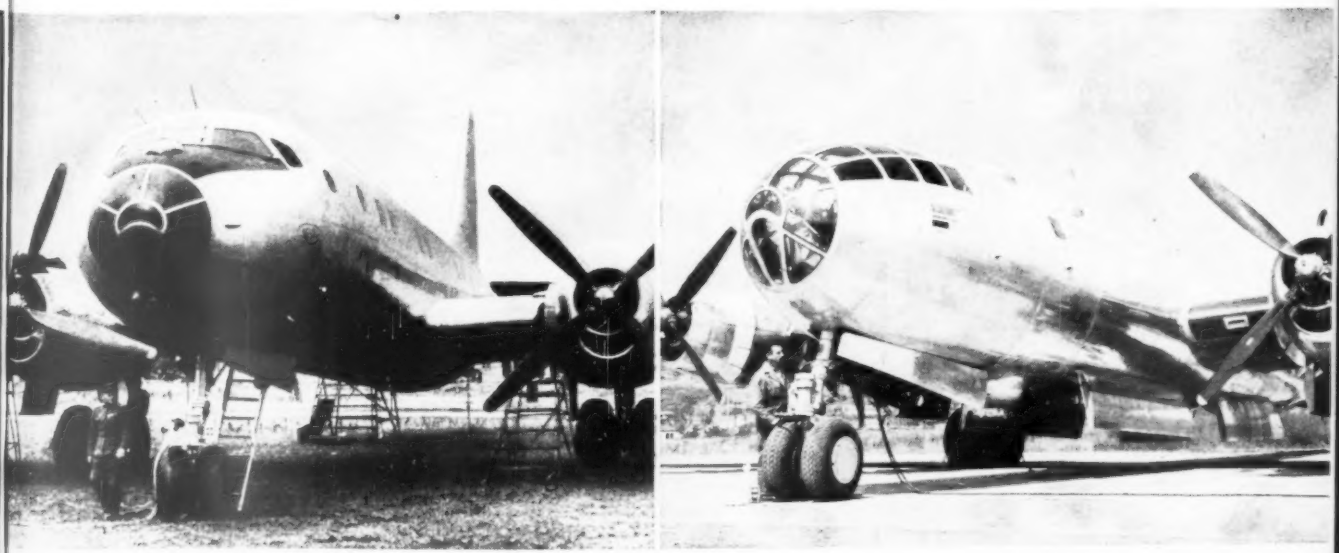
Combat B-29s seized by Soviets are copied in new Red airplane.

Instead of heading southwest across the China Sea, Captain Price turned the *General Arnold* north toward the Soviet Far East. The waters of the Sea of Japan sped underneath and the harbor of Vladivostok hove into view. Captain Price circled. He had reason to be hesitant for great mushrooms of antiaircraft shells began to burst around him. From the airport where he wished to land, he saw the Red Air Force fighters rise. They climbed rapidly and assumed a commanding position about his plane. The antiaircraft fire then ceased. It was plain that the Russians had decided to take the bomber intact. With his fighter "escort," Captain Price came in to land.

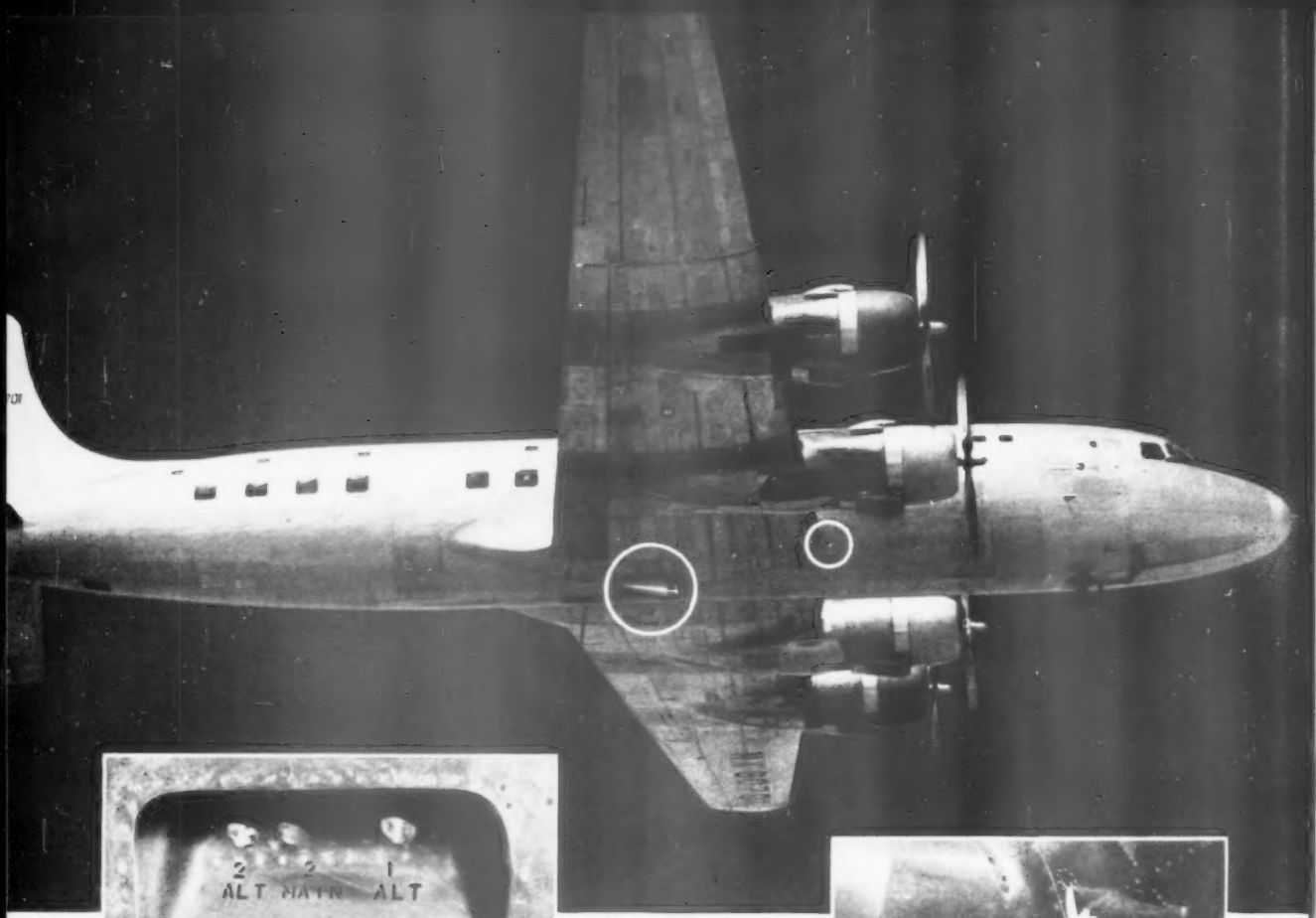
The *General H. H. Arnold Special's* crew was given no opportunity to refuel and fly back *(Continued on page 74)*

ONE PLANE THE SOVIETS GRABBED

One of interned B-29s was the Gen. H. H. Arnold Special, one of most famous planes to come out of Boeing Wichita plant. It had flown many successful missions in the far eastern theater. Then suddenly it disappeared. This article tells what happened to it.



Striking similarities between Tu-70 (left) and B-29 are most evident in this quarter front ground view. The main landing gear structure, its fairings and doors, and the nose gear are practically identical. So are the propellers, hubs and the nacelles. Unusual likeness is the bombardier's nose window, which is identical on both planes—though the Tu-70 is supposed to be a "transport."



Redesigned fuel tank vents have been moved out to the wing tips in modification.

Fire hazard in DC-6 resulted when gasoline overflowed from fuel tank vent (small circle) above, and poured into the air intake (large circle) which carried it into gasoline heaters. Intake was relocated on wing.

Sealed vent on modified DC-6 is pointed out by author. Arrow indicates location of airscoop which picked up the overflowing fuel.

Douglas' big money maker is back on the airways with 132 design changes.

RETURN OF THE 'SIX'

By MAX KARANT

FIVE major airlines are once again operating their Douglas DC-6s, after a four-months grounding that already has cost each line and the Douglas company many millions of dollars. The five airlines are American, United, Panagra, National and Braniff.

After several months of successful operation, two major accidents—one fatal—forced the airlines to voluntarily ground all DC-6s until the trouble was found and remedied. A total of 97 DC-6s was grounded from November to March. One airline—American—estimates the grounding of their planes cost them $30,000 a day in lost revenue. The American Airlines fleet of 50 ships will have cost approximately $3,000,000 to modify. Most of the cost of the DC-6 modification program is being borne by the Douglas company.

It all started October 24, 1947, when a United Air Lines DC-6 caught fire over the Rocky Mountains and crashed just short of the Bryce Canyon CAA emergency field, killing 52 persons. Then, on November 11, *(Continued on page 81)*

AVIATION PROPHET

Long-time aeronautical and automotive engineer, William B. Stout takes the unconventional view. Himself a designer of successful aircraft, Stout calls for "imagineering" a universal plane. He feels the approach is one of ingenuity—not mathematics. This is the first of a series of discussions.

BILL STOUT ASKS:

Can We Have a Universal Vehicle?

Controllable wing plane represents unconventional approach the author favors.

Only roadable planes can build mass demand, inventor believes.

THERE is nothing the matter with aviation that a little serious study and development will not cure. There is much wrong with it if we leave it as it is.

The hour is fast approaching when the next move must not only be known—but acted upon.

The aviation problems of today need a direct solution. These solutions must start from the engineer and they must be basic. Their answer is in no book. Money alone cannot create them.

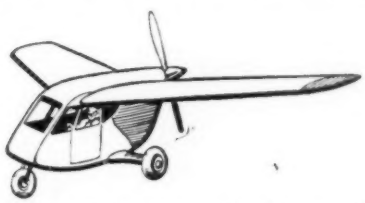
No matter how keen an engineer may be to begin actual experimentation with a design, he must first organize in his mind what the design must accomplish.

To most engineers, the only necessary result is that it must work. That is enough in the beginning.

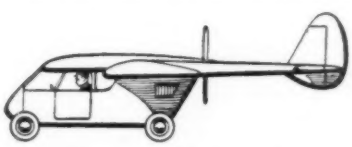
It was enough for the Wright Brothers, but it is not enough today.

It was enough that the first motor car should run. That made it an automobile. But it took Henry Ford to see first that unless he could build a car for *(Continued on page 56)*

Wings on springs? Waterman used them successfully.



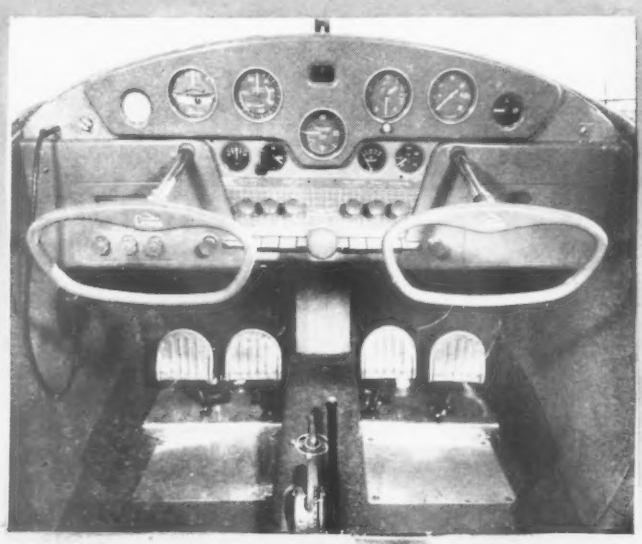
A real door is possible—Waterman's plane proved it.



Roadable's wings may be left at airport or taken along.

Roomy cabin features Cessna's new four-placer. Front seats are mounted on rails so pilot can adjust distance from controls to suit his comfort. Right seat rolls farther back than left seat which is limited so pilot can't get too far from controls.

Instrument panel layout of new Cessna 170 is identical with that of two-place Cessna 140. So is arrangement of controls on both planes.



Cessna 170 is roomy new four-place airplane priced at $5,475 f.a.f. Wichita, Kans. Plane cruises over 120 m.p.h., has 500-mile range.

THE *Cessna 170*

THERE is nothing revolutionary about this airplane, yet it is one of the most refreshing additions to the present personal-plane market I have flown in some time.

When I flew the 170 I had an excellent chance to see the airplane at its best. The weather was borderline all day. Few lightplanes were flying. The ceiling eventually came down to 500 feet, it drizzled almost all the time I was aloft, and the wind was 25 m.p.h. with gusts. The high wind, of course, gave the 170 I flew (NC-2502V) amazing take-off and landing performance. When I flew it alone I was off the ground and climbing over 800 f.p.m. within four seconds from a standing start. Carrying two people besides myself I made one take-off in seven seconds and another in eight.

The 170 is as simple as Cessna knows how to make it. Their ingenious engineering department has come up with a new four-place plane that is as much as 70 per cent interchangeable with other current Cessnas (the 120, 140, 190 and 195). That's at the factory, of course. Out in the field, distributors' stocks will be 50 per cent interchangeable, which is no mean economic achievement in the personal plane business.

For example, the landing gear on the 170 is the same as that on the 140. The 170's tail assembly is the same as that of the 190 series. The control system is identical to that of the 140. So is the instrument panel. The 170 wing ribs are the same as those of the 140. And so on.

Besides such ingenuity, of course, you've also got to have a good airplane. And now that I've kicked a new 170 around for a couple of hours I'm convinced that, once again, Cessna's come up with a very worthy addition to the market. Here is an all-metal four-place high-winged monoplane that carries a 1,000-pound payload at an honest cruising speed of between 123 and 125 m.p.h., using 63 of the engine's 145 h.p.

I found the best angle of climb to be at 65 m.p.h.—and the attitude of the airplane at that angle is enough to scare the unsuspecting pilot. Best rate of climb is at an indicated air speed of 85 m.p.h.: I made several climbs (with two of us in the airplane) at 820 f.p.m. The airport from which these flights were made is 1,360 feet above *(Continued on page 79)*

FLYING's CHECK PILOT

EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Approved Type Certificate are flown. The author is not a professional test pilot. He evaluates each aircraft through the eyes of an average private pilot who flies an airplane either for business or sport.

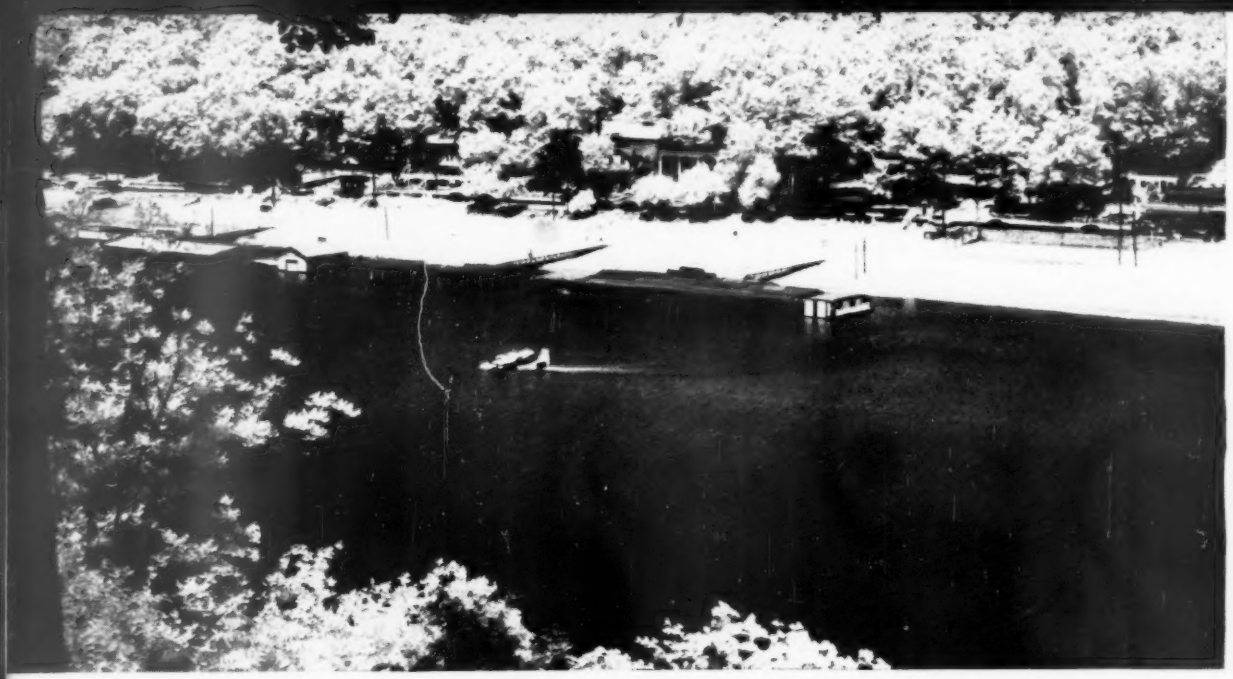
Float trips are a White River specialty. Current carries boats downstream as guides pick best fishing spots.

Roaring River State Park near Cassville has an airport four miles distant. Daily rates at park's hotel and stone cottages begin at $2.

Two unusual craft at Rockaway Beach are a bicycle boat, propelled by peddling, and a "buggy barge" for the lazy. Boats are rented at dock.

Roc

35



Rockaway Beach on Lake Taneycomo is near Branson Airport. Seaplanes land on lake and tie up at boat docks. Resort has over 250 cottages.

A FLYING Holiday

MISSOURI'S

White River Country

Ozark Mountain resorts are a short flight from most midwestern cities.

LESS than a decade ago, mountaineer farmers in the Southwest Missouri Ozarks would lean back on plows and gape when flying machines roared overhead. Today these same mountaineers hasten their plowing so they can get out to the airport for a couple hours flying before dark.

That change has wrought wonders in the Missouri Ozark Country drained by the White River. These hills contain such resort areas as man-made Lake Taneycomo, Roaring River Park, the Shepherd of the Hills country, Lake Norfork and fishing streams around every turn in the road.

It's now possible to fly into the region, set your plane down on any one of a dozen Ozark landing strips, and step into a rugged vacation in hills containing fine fishing and cool nights.

Tops in resort facilities is Lake Taneycomo's Rockaway Beach, which has five hotels and 250 housekeeping cottages (accommodating two to 10 persons each). Rates at the hotels begin at $45 per week for two persons; cottage rates begin at $30 per week for two. The lake, with 100 miles of shoreline, contains large and small mouth bass, crappie, blue gill, jack salmon, and channel-, blue- and yellow-catfish. (Missouri fishing licenses are sold at Rockaway Beach. Cost is $3 per year for non-residents, $1.50 per year for residents.) No charge is made for use of *(Continued on page 76)*

String of bass from spring-fed Ozark stream. Fishing in impounded waters is legal from March 15 to December 31.

TROUBLE FOR *Fly-By-Nights*

By
WILFRED OWEN

Personal planes still are not being used on a 24-hour basis. Why not? Perhaps developments in the offing will point way to greater safety after dark.

WHEN FLYING AT NIGHT

(Navy's Advice to Pilots)

1. Don't night-fly until your eyes are accustomed to darkness.
2. Maintain adaptation to darkness by avoiding all light.
3. Glance—don't stare—at lights, even though red.
4. Know your cockpit and instruments blindfolded.
5. Keep your windshield clean and unscratched.
6. Look for "targets" out of the corner of your eyes.
7. Scan continuously; move eyes over small areas.
8. Use oxygen on all night flights over 5,000 feet.
9. Learn to identify and spot objects by contrast.
10. Keep physically fit and alert; never fly while tired.

ONE THING a lightplane pilot can do to help his night flying is to watch his diet. If you fly after dark, remember that a cheese omelet is chock full of Vitamin A, that carrots and peas are also good for night vision, and peaches make a dandy dessert. If in doubt, top off with cod liver oil.

Seeing things at night is more complicated, of course, than anything a dose of vitamins can handle alone. You can't eat your way out of a predicament, and that's what you'll be in, with nothing to fall back on but fruits and vegetables. So far, however, no great strides seem to have been made toward putting the private plane on a 24-hour day, and talking about the pilot's diet isn't going to make matters much better. The fact is that personal flying is still largely on daylight time, and it will take a lot of doing before the clock is pushed ahead to the time when night flying is standard.

Flying in the dark is admittedly a good deal more difficult than flying at high noon. Most birds feel this way about it and stay home at night. But for man the nest is not always the most restful place after a hard day at the office, especially when man can have wings. So the vehicle he uses to get about in must be usable in the dark. There will be strict limits to mass flying if the masses are going to have to land for curfew.

Anyone who has stumbled over the baby's tricycle in the dark, or groped for a key-hole in a black-out, knows some-

Night cross-countries can be difficult. It's hard to see horizon, hard to find landing fields, easy to get lost and easy to make mistakes. That's why pilots must use extreme care at night, and why night lightplane utilization is low.

Airport lighting equipment is improving but comparatively few fields have facilities. Note way 4,200-foot runway (below) is defined with Pioneer Electric Company airport lighting system. View is from plane approaching the field.

thing about the difficulties of night operations. The pilot has the same problem of adapting his eyes before a night takeoff, the principal difference being that once in the air, groping is out. This adaptation is a lengthy process, for while the human eye responds quickly to light, it is slow to accustom itself to darkness. To insure proper vision, military pilots are advised to spend 30 minutes in a dark room before taking off, or to prepare their eyes by wearing red-lensed goggles for a similar length of time. And while sitting around in a dark room isn't the quickest way to get places, this preparation before flight increases the sensitivity of the eyes 10,000 times.

Becoming used to the dark is only the first step. A pilot must maintain this owlish condition throughout his flight by shunning the bright lights, both in and outside the airplane. One look, and the sense organs for night vision are out of order again. Military accident records show that one of the most frequent accident causes on night take-off during the war was temporary impairment of vision which resulted when flashlights were used to make cockpit checks, or when cockpit lights became distracting. Cockpit lights must be dim, and red lights should be used whenever possible. The night pilot must read his instruments or map quickly and look away, or, better still, look at them with one eye and save the other. And he should know the *(Continued on page 72)*

X MARKS THE SPOT

By JOHN R. HOYT

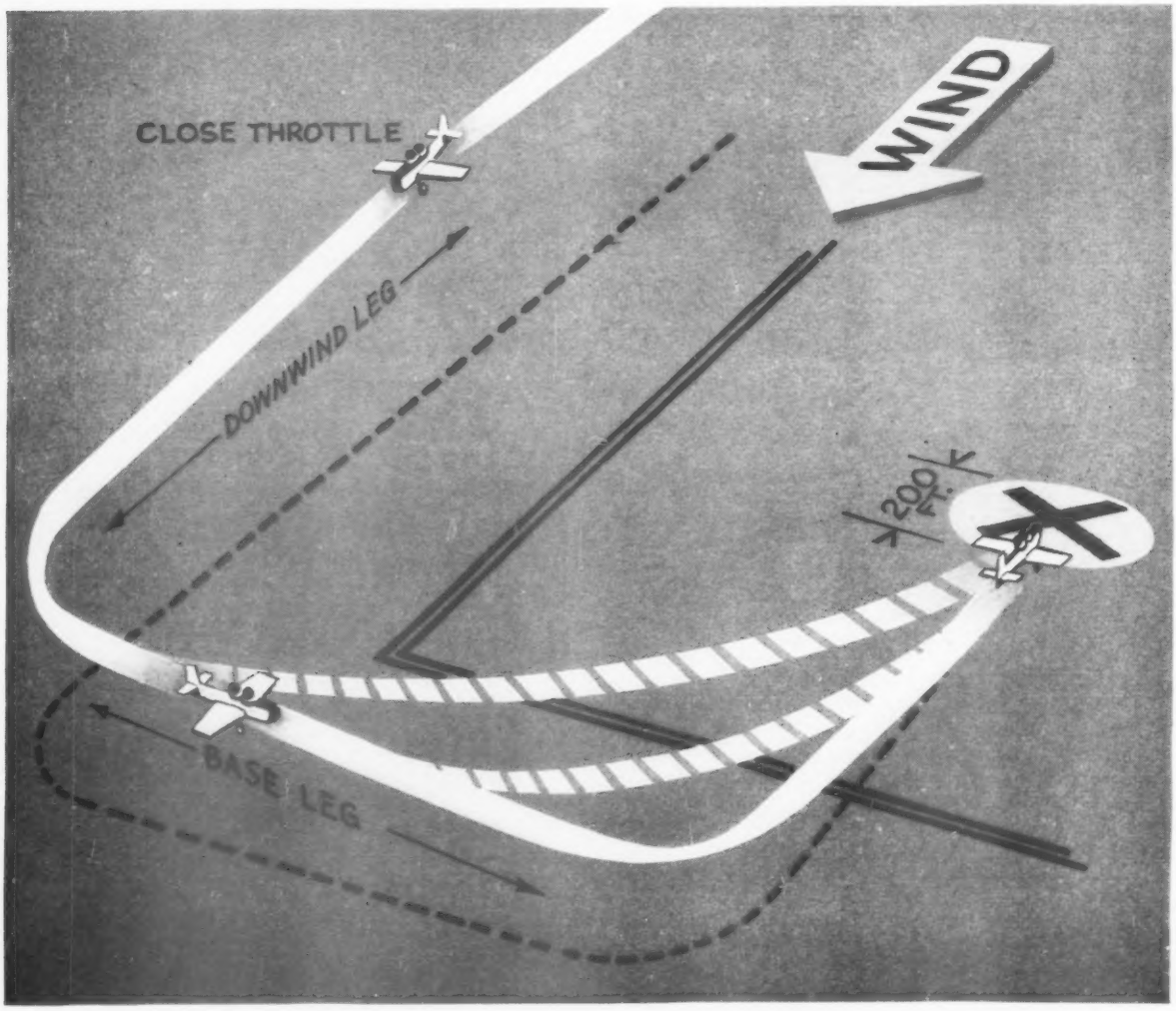
Why practice spot landings? Here are good reasons.

THE FLIGHT EXAMINER, feeling a peculiarly unhappy sensation somewhere between his safety belt and his parachute, permitted his hands to slip casually toward the controls and watched the 200-foot circle up ahead. Thousands of hours of flying told him that the nose was pulling up, the air-speed was falling off, and the airplane was about to settle or "fall off."

Pulling the nose up during spot-landing practice does help when a pilot is overshooting, but all too often "X" marks the spot where the plane collided with the ground at the end of a dangerously slow glide. Students, private pilots and applicants for flight-instructor ratings are guilty of the same tendency, the extreme desire to hit the spot at all costs, rather than to demonstrate the know-how or technique of flying the airplane.

Actually, the spot landing in itself is a worthless maneuver and an increasing number of instructors believe that accuracy landings should be eliminated in flight training. Others feel that a power approach is the answer, while still others say that a slip should be permitted in all approaches. What is the rational answer to this problem?

Let's go through the spot landing as it is required by CAA. According to Civil Air Regulations, the pilot must execute "a series of three landings from an altitude not to exceed 1,000 feet, with engine throttled and a 180° change in direction." Nothing is said about pat- *(Continued on page 62)*



Playing the turn is a simple procedure on the base leg, but many pilots have a hard time learning how. To avoid landing beyond spot the pilot should make turn gradually or delay it until the last minute. Pilot in diagram might have turned at any point on base leg.

Midvale Flying Club meets monthly in workshop of Mechanic Harry Thalman, a charter member. They discuss common problems and financial affairs of club. Below, the group's Cessna 120 lands at Stanley, Ida., in the heart of a hunting and fishing area. Trip costs $21.

Salt Lake City club members find secret of low-cost flying.

How To Fly For $3 an Hour

By BOB HALLIDAY

Editorial Department, Salt Lake Tribune-Telegraph

ONE OF THE commonest injuries in private flying is a fractured wallet. Thousands of student and private pilots ground themselves every year, not because they run out of zeal but because they run out of dough. These thousands could stay in the game, and in the chips, by following the formula of Midvale Flying Club—28 men and a girl with a Cessna 120 that flies for $3 an hour at Salt Lake City, Utah.

The Midvale club has no minimum flight pay demands and no extra monthly fees. Members pay only for the time they fly and at a cost so low it makes a car seem like a luxury.

In February, 1940, Cort and Fred Rosenhan, brothers of Midvale, U., 10 miles from Salt Lake, borrowed $1,500 from a bank and bought a new Piper *Cub Trainer*. They then collected $51.50 from each of 27 other embryo pilots and obtained a state charter for their club, incorporated to avoid any individual liability for debts or damage. The club's primary aim, as a non-profit organization, was to bring flying within reach of pilots with limited incomes.

They established an hourly rate of $2.40 solo and $2 dual. Chargeable flight time is considered as the period from "switch on" to "switch off" at the end of the hop. With $3 an hour for the instructor, the cost to members for dual training amounted to $5 an hour. Fixed base operators at that time were charging $7.50 to $9.50 per hour. Members saved over one-third on training expense.

In 17 months the J3L was flown over 2,000 hours without accident, despite the fact that most of the time was put on it by student pilots.

Then came the first assessment of $10 per member to buy

a new 65-h.p. Taylorcraft in July, 1941. New memberships were raised to $7. Rates remained at $2.40 and $2. Although the Taylorcraft wasn't flown extensively during the war, the club managed to keep its head above water without boosting the rates. In all the ship chalked up 2,900 hours.

In December, 1946, the Taylorcraft was turned in on the present Cessna 120. Membership fees were increased to $115 and the flight rate to $3 per hour. During 1947 over 600 accident-free hours were put on the Cessna and over $300 surplus put in the bank. This surplus is used for major overhauls, insurance and a depreciation fund to apply on the next ship.

The only insurance the club has ever carried is the inexpensive landing-theft-fire type for $77.80 per year. To carry full crackup coverage would necessitate higher flying rates, so lack of coverage is offset by stressing safety in operations.

The club screens applicants carefully. When a member wants to quit the club he notifies Ken Sharp, secretary-treasurer, who then calls in the next applicant on a long waiting list. This applicant appears at the following club meeting, held monthly in the workshop of member Harry Thalman. The applicant shows his driver's license, which has a list of any traffic violations on the back. If his driving record is clear, he is then questioned on his reasons for entering the club and his background. Because the club's primary goal is to aid beginners, lack of experience is, if anything, in the applicant's favor. But his subsequent flying habits, along with those of all other members, are closely watched and any dangerous tendencies are reported to the club, which votes on whether to warn, suspend or oust the offender.

Club's mechanic, charter member Mark Kemp, handles maintenance and major repairs on club plane at areas' prevailing rates.

Only girl member is Dorothy Bancroft, who flew with WASP 16 months during war. She's ready for flight with Kenneth Sharp.

This close surveillance pays dividends. It stops dangerous habits before they become fatalities. Not a single CAA or tower violation has ever been written up against a club member and there has been only one accident in the club's eight-year history.

The club got soft-hearted just once—and paid for it. A likeable student pilot member was reported twice for sloppy flying. Both times the club voted to warn him but let him keep his membership. One week after the second warning the errant member brought the Taylorcraft in for a wing tip landing that cost the club $900. All members are equally liable for any damage to the plane, regardless of how it happens, and in this case each member paid an assessment of $10. This, with the club's surplus kitty, covered the cost of repairs.

Club planes have always been based with Thompson Flying Service at Salt Lake municipal airport because of its central location in the valley and because most of the members live in the city. Thompson handles flight appointments, provides hangar space and minor repairs. All major repairs are made by Mark Kemp, owner of Midvale Flying Service and an A&E mechanic, at prevailing overhaul rates (100-hour check, $18; major overhaul, $125 to $150). Kemp is a charter member. Thompson takes in all flight revenue, deducts a 10 per cent handling charge, and makes regular charges (gas 31 cents, oil 40 cents) and hangar rental $15. He refunds the monthly balance to the club. Out of this surplus comes annual insurance and taxes.

The club attributes its success to the low flight rate, which encourages frequent use of the plane, and to its large membership. The latter factor members emphasize strongly. They feel that a limited membership—such as 10 members—doesn't use the plane often enough to pay the freight.

Any cross-country involving the major portion of two days must be approved in advance at a club meeting where the members vote approval, except in the case of emergency or spur-of-the-moment trips which can be okayed by Cort Rosenhan, president, and Ken Sharp. The only other regulation on cross-country hops is that any trip involving Sunday must include pay for two hours flying time for each half day of Sunday the plane is away from home base. Except for hangar rental, all expenses incurred away from the home field are deducted by the member from his $3 per hour trip payment.

During the past year members have flown the Cessna to the Cleveland Air Races; to Lethbridge, Canada; to Los Angeles, and to Arizona, Montana and other intermountain states.

As a possible guide to other clubs, a brief of Midvale's regulations follows:

A. MEMBERSHIP

Membership is obtained by purchase of one equal interest in the club incorporate for $115.

All membership transactions are handled by the club, for which a fee of $5 is charged. This fee is assumed by the leaving member. Memberships are held at a fixed number, twenty-nine (29). The club does not absorb or increase memberships. Members desiring to sell their share retain same until an acceptable buyer is secured. Retention of membership is not dependent upon the payment of dues, however assessments may be made if conditions warrant, by a vote of a quorum of the membership. Such assessments are made only as a last resort when (Continued on page 84)

Silvaire Observer-90 is new all-metal tandem Luscombe just entering production. Plane cruises at 112 m.p.h., lands at 48, can take off in 550 feet. Price: $3,195.

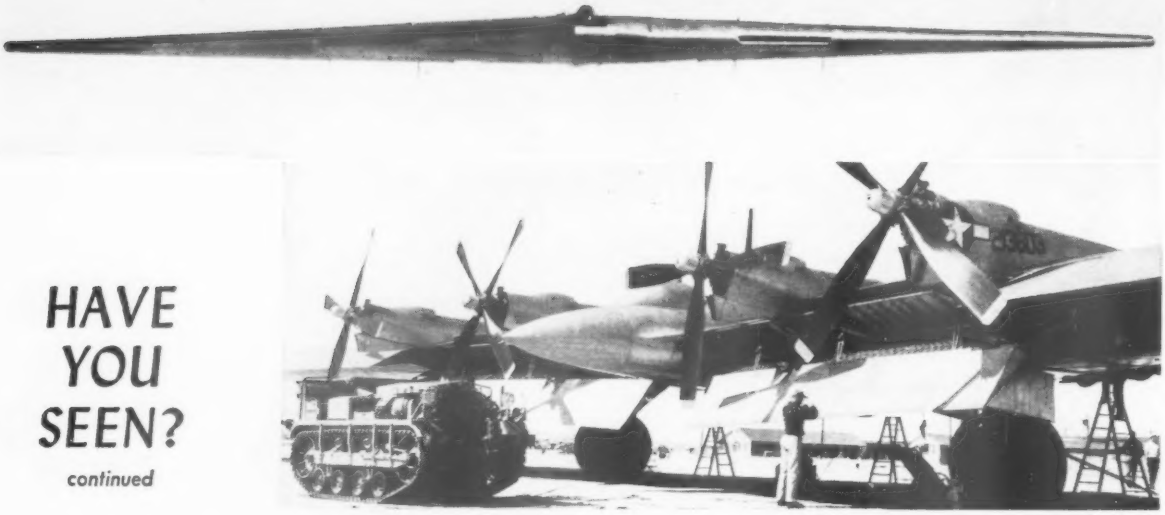
HAVE YOU SEEN?

Jet orifice of Grumman Panther (XF9F-2) is located short of tail. Note clean belly lines and unusual fairing of Navy fighter. British-designed Nene jet engine propels the Panther faster than 600 m.p.h.

Belly Flopper is home-made plane built by Erwin Mueller, Milwaukee. Single-place craft can cruise at 150 m.p.h. with two 40-h.p. Continental engines. Pilot flies plane from prone position. It has 17 ft. 5 in. wingspan, is four feet high, has empty weight of 650 pounds.

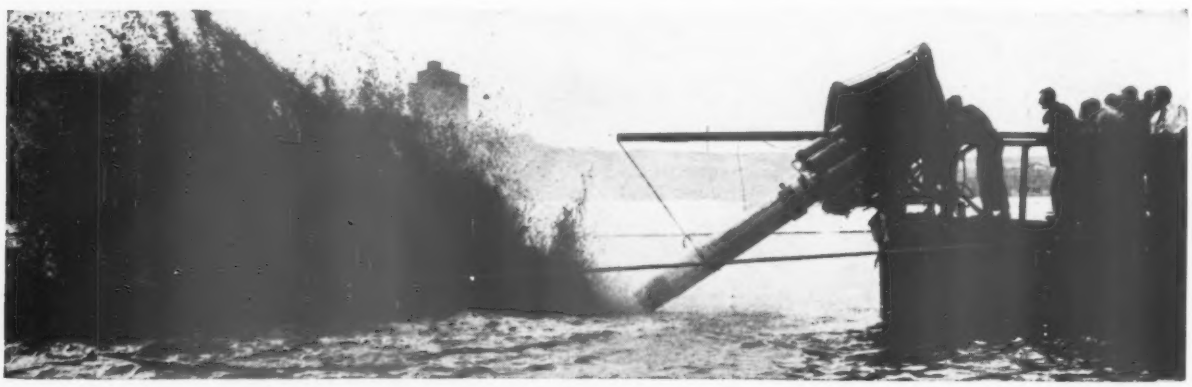
HAVE YOU SEEN?

continued



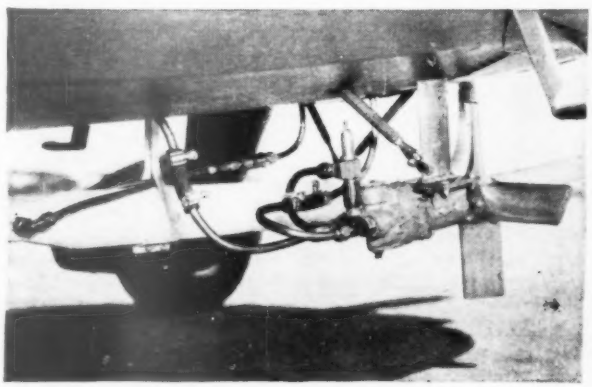
Flying wings by Northrop are shown in unusual photos of YB-49 (above) and B-35 (below). Though the eight-jet YB-49 looks knife-thin, members of 13-man crew can walk upright in center section. Modified B-35 has new four-bladed "butter paddle" props replacing counter-rotating props initially installed.

"Confederate Air Force" insignia does not augur another war between the states, but stands for a new non-profit fraternal organization which so far has recruited 1,500 members—all southerners. Stars and bars insignia of the "air force" is painted on a PT-17.



British jet engine clears mud from river bottoms. The turbo-jet is mounted on boat in experiment being conducted by Ministry of Supply. Its powerful blast is directed at the soft bottom of the Thames, loosening it, and spurting up huge quantities of water and mud.

Four models of Grumman amphibians are, top to bottom, the fast new Mallard transport, which carries eight to 10 passengers; the shorter-ranged, slower, five-place Widgeon; the eight-place Goose, and the Duck, used for Navy patrol. Not shown: the big new Albatross.



DDT-spraying apparatus was developed by Piedmont Aviation of Winston-Salem, N. C., for disease control in Indo-China.

DeHavilland Dove, redesigned for floats in Canada, has been undergoing tests in Toronto. Dove is eight-place feeder plane.

Author's Cornell became unruly when a parachute broke loose and jammed the rear cockpit controls.

I Learned About Flying From That! NO. 103

What can you do when a plane's in a spin, controls are jammed —and you're out on its wing?

By William C. Paynter

FLYING is one game in which the old axiom "You're never too old to learn" is bitterly true. On the other hand—if you don't learn early in your career you'll never get old in the first place. I should be able to arrive at some brilliant conclusion with that kind of logic. Something in it smacks of a vicious circle, though.

To make a long story more hair-raising, I am the flying end of an instrument school at Capital Sky Park, West Sacramento, Calif. One June day in 1947, I was getting a Fairchild *Cornell's* radio repaired at an airport several miles from Sky Park. A student was waiting at the home field, and I was inhaling cokes and chewing fingernails because of the delay. When the radio man picked up his tools and evacuated the rear cockpit, I scrambled into the front seat, grunted something about being in a hurry, bellowed "clear" and fired up the Ranger, not bothering to check the rear cockpit.

The radio man was on his way back to his shop when I remembered the loose parachute in the rear seat. I called the mechanic back, and asked him to be sure the extra chute was strapped down. He opened the rear canopy, made sure the belt was locked over the folded chute and pulled the adjustable tail on the belt until the chute was secured. I thanked him, taxied out to the runway, made my cockpit check and run-up, and took off, blissfully ignorant of the ungodly series of events slated for the next two hours.

At 2,000 feet I trimmed the *Cornell* and amused myself with a little hands-off flying for a minute or two. Then a brilliant idea filtered into my solid mahogany head: "a stall—just to keep my hand in." Sure, that's what I'd do; a stall, by gum, with full flaps, power and *(Continued on page 83)*

Here's why so many business men are buying and flying

America's No. 1 Utility Plane

MANY a middle-aged business man has told us, "I'm too old to learn how to fly"—only to find himself, flying on his own, soloing a Stinson, after about 10 hours' easy flying time!

That's not hard to understand. Almost anyone who can drive a car can learn to fly the new spin-resistant Stinson, quickly, easily and safely. This is just one of the reasons why Stinson has become America's biggest-selling 4-place personal plane—especially with "over-40" owners who use it for year-round business *and* pleasure.

Stinson *utility* counts even *more* with these practical people. It carries 4 people and 100 pounds of luggage...or the pilot alone plus 640 cargo-pounds.

It's truly a "fly-anywhere" plane, too, with quick take-offs and slow landings. Cruising speed: 130 m.p.h. at 5,000 feet. Non-stop flying range, 554 miles.

See your Stinson dealer, today, for a demonstration flight!

For literature, write Stinson Division, Dept. D, Consolidated Vultee Aircraft Corp., Wayne, Michigan.

Stinson

For 22 years, builder of
America's most *USEFUL* personal planes

He makes his Stinson work for a living!

1. "I learned to fly at 47," says manufacturer Howard M. Smith of Holly, Michigan. "Now I use my Stinson constantly, to contact customers in every part of a 400-mile area."

2. "One rush delivery of the small springs we manufacture kept a customer's plant from closing down, and resulted in doubling our business with that firm," he adds. "That one flight alone more than paid the cost of my plane."

3. "I have more time with my family, too," Mr. Smith concludes. "The four of us take many pleasant trips in the Stinson. We feel it's safer than traveling by highway. There's nothing like a Stinson for fast, comfortable family travel!"

FREE FLIGHT INSTRUCTION

If you are a business or professional man interested in learning to fly, we invite you to inquire about your Stinson dealer's free flight instruction plan. Write W. H. Klenke, General Sales Manager, Stinson, Wayne, Mich. No obligation.

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

IN 1942, when the National Research Council's Crash Injury Research Project was formed, there was a wide-spread belief that two-inch, 2,000-pound safety belts would cut people in half or cause serious internal injuries.

Today, lengthy C.I.R. tests have proved that a safety belt's snubbing action protects and does not injure the center portions of the body. These tests have shown that portions of the body stopped by the belt can apparently tolerate decelerations of forward velocity in the order of 25 G.—which is much greater than will be experienced in most survivable accidents.

As a result of this research, new safety belt standards call for a belt designed to withstand a minimum load of 3,000 pounds applied in tension (a 50 per cent greater strength is required in the webbing to be used). This implies that future belts will have a holding capacity of 6,000 pounds when used for one person.

No agreement has been reached regarding increased strength for the belt's anchorage points. Unless the present 850-pound anchorage point requirement is increased, the holding capacity of the 3,000-pound safety belt will be no more than that of the 2,000-pound belt.

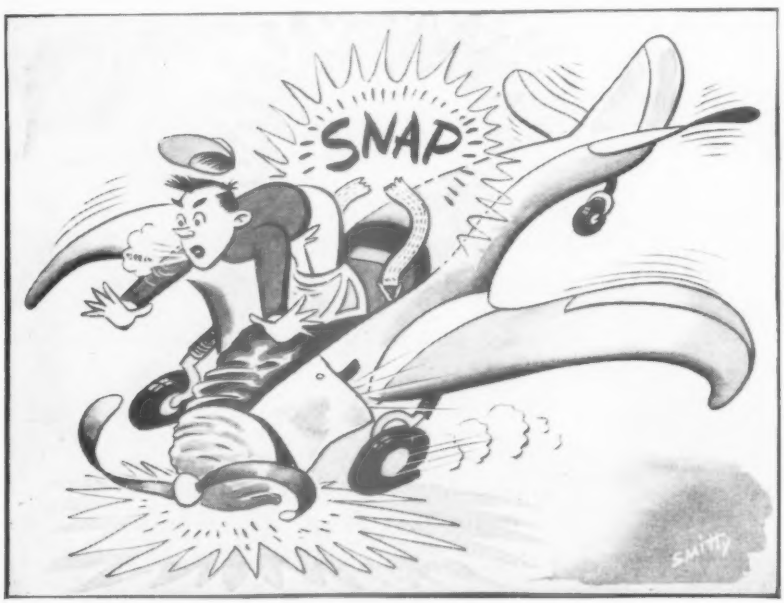
Research has shown that head injuries are the dominating cause of fatal and serious accidents. Because of the head's 10-pound weight, it strikes a sledge hammer blow when it flies forward and smashes into the instrument panel or cabin structure. In almost every accident the head strikes some object and, in many severe accidents, the degree of injury—minor, moderate or fatal—is governed solely by the *kind of structure* the head hits, not the velocity and seeming "severity" of the crash.

In some accidents, under impact velocities of 50 to 100 feet per second, the head is stopped within a few inches without dangerous injury because it strikes light, yielding structures. Today, however, pilots and passengers have little chance of striking "soft places" in the instrument panel or adjacent structures.

As a result of these findings, AOPA and other organizations interested in aircraft safety, have advocated (1) stronger safety belts, (2) shoulder harness as standard equipment, and (3) redesigned instrument panels.

Crash Injury Research officials have set forth the following measures which they say, if applied, will radically increase lightplane safety.

1. Hold landing speeds and slowed-down flight speeds to 60 m.p.h. or less.
2. Provide adequate stall warning in fast and slow turns.
3. Provide crash protection at slowed-down flight speeds through:
   (a) Rugged cabin structure.
   (b) Increased energy-absorbing characteristics of landing gear, wings and forward sections (to increase the protection of the cabin and its occupants).
   (c) Individual safety belts with holding capacities—as installed in the aircraft—of 4,000 pounds.
   (d) Provision of anchorage points for shoulder harness, so that pilots who want to install and use harness can easily do so.
   (e) Control wheel installations with an "impact drag" to check high relative velocities between the head and forward structure.
   (f) Redesign and rearrangement of dangerous objects and structures within striking range of the head—instrument panels, seat backs, doorposts, tube clusters, etc.



Inadequate safety belts are almost as bad as none at all. AOPA believes crash protection can be improved by requiring individual safety belts with holding capacities of 4,000 pounds.

AIRPORT CERTIFICATE

AOPA's Airport Certificate, recently awarded to Southampton Airport, England, was presented to Airport Manager L. E. Payne at the annual Aerodrome Owners' Association meeting in London last month. Presentation was made by Charles Newton, chairman of the association. Lord Nathan, Minister of Civil Aviation, was present.

W. O. Hebbes, AOPA 16666, of Eastleigh, Hampshire, England, reports the certificate created a stir among British flyers. A newspaper clipping stated: "As Southampton Airport is still in battle-dress—its building program stopped in 1939 and marks of its wartime service are still evident—it is encouraging to consider that it must have been on the basis of personal service rendered by the staff that such an honor was bestowed.

"It must be gratifying to the Borough Council that the airport should have been singled out of all Britain for the certificate."

ASSOCIATION-WISE

Five more Pilot Service Bulletins have been added to AOPA's list—"Cuba," "Economy Races," "Aircraft Noise Level Study," and "Mexico." Copies may be obtained from AOPA National Headquarters. . . . New AOPA Unit has been organized in Anderson, Ind. Officers are Charles Humphrey, AOPA 22115, Chairman; Miller Huggins, AOPA 32235, Vice-Chairman, and Charlotte Darlington, AOPA 40523, Secretary-Treasurer. . . . Three more units are being organized in Schenectady, N. Y., Oxnard, Calif., and Blytheville, Ark. . . . AOPA's chome eight-inch car emblems and the three-inch gold lapel wings are now seen at every airport. Do you have yours? . . . AOPA pilot registration has jumped 10,000 since last May. Washington servicing staff has been doubled. . . . Two big AOPA Flights that you should mark as "*musts*" are the New England Seaplane Regatta, Lake Winnipesaukee, N. H., May 29-30-31 and "1,000-plane" Nantucket Flight, Nantucket Island, Mass., June 19. END

Two Presidents Agree... ON ESSO!

"WITH US it's Esso — because of the wide customer acceptance of such outstanding aviation fuels and lubricants."

Capt. Jesse F. Stallings
President of Capitol Airways, Inc.
Cumberland Field, Nashville, Tenn.

"OUR FIRST requirement is dependable transportation. So we insist on our planes being serviced with Esso Aviation Products."

Harry B. Dyer, President
Nashville Bridge Company
Nashville, Tennessee

ESSO AVIATION PRODUCTS are the result of never-ending research... the joint effort of over 2000 scientists and technicians working in America's largest petroleum laboratories — perfecting the kind of aviation fuels and lubricants that experienced flyers have learned they can depend on!

North to Newfoundland

(Continued from page 25)

for Newfoundland from Round Lake, N. Y., in a J-3 on floats. First stop was Lake Winnepesaukee, the second Waterville, Me., and the third Eastport, Me. I left Waterville about 5 p.m., but not until I looked down at the shoreline beneath me did I recall the high tides of the Bay of Fundy and wonder what sort of facilities I'd find at Eastport. I found a concrete ramp but no haul-up—and a mooring buoy but no boat to ferry me to shore if I moored. The airport manager suggested a nearby lake where I parked the plane on a beach and rode back to town in a cab he sent out to get me.

Next morning I cleared customs outward (no longer necessary) and after phoning ahead entered Canada at St. John, New Brunswick, where an airfield and customs officials were close to the St. John's River. Clearance was fast and simple because I'd given notice in advance. I brought a can of gas down from the airfield after clearance and filled the tank before taking off for New Glasgow, N. S., where I landed on the river and sent a cab to the airport for two cans of gas. Since I traveled alone, there was room for an extra five-gallon can inside with my luggage. Half an hour later I was on my way to Sydney, which I reached at 5:30 p.m. With any sort of break, I'd have been in Newfoundland that evening. The flying was smooth, the ceiling was wide open and there was little wind.

But a mixup in arrangements caused a three-hour delay in delivery of gas from the airport, making it too late to hop across the strait. I did have time, however, to fly up to the northern tip of the province where I landed on a brackish water pond and stretched out in my sleeping bag inside the plane. I knew if I missed that spurt of good weather, I might be held up for days, and I wanted favorable conditions for that water crossing. During the night I awoke occasionally only to find clouds building up, coming in from the south. As soon as I could see, I took off and rode a 35 m.p.h. tailwind for two hours to cross the open water and continue on up Newfoundland's west coast to Stephenville. One more hop of 70 miles put me at Lomond where gas supplies were waiting.

I'd left spring in full bloom behind me but found the high plateaus and mountain tops still patched with snow. The first runs of salmon and trout were entering a few of the early rivers and the whole fishing season lay ahead. It was for this I had flown 1,000 miles; nowhere closer could I find anything its equal. The Atlantic salmon is a prized angling trophy and a relatively rare one. Few good salmon rivers are open to public fishing, and of those the easiest to reach are in Newfoundland. They remain unspoiled because they are comparatively isolated; unfished only because they are too hard to reach—except by air. Working from Lomond at the base of the long northern peninsula on the west coast, I could let down on lakes in the flow of unfished rivers, or land on bays where rivers meet the ocean.

Flying alone, with only camping supplies and a sleeping bag, I was able to extend my fishing over a number of days. With a companion aboard, we were able to fish out the day, and fly home or to the nearest settlement before dark closed in. I often flew in my waist-waders so I could drop off into the water at knee depth and wade the plane in to shore. It took just about five minutes from the time the plane touched the water till I was casting a fly.

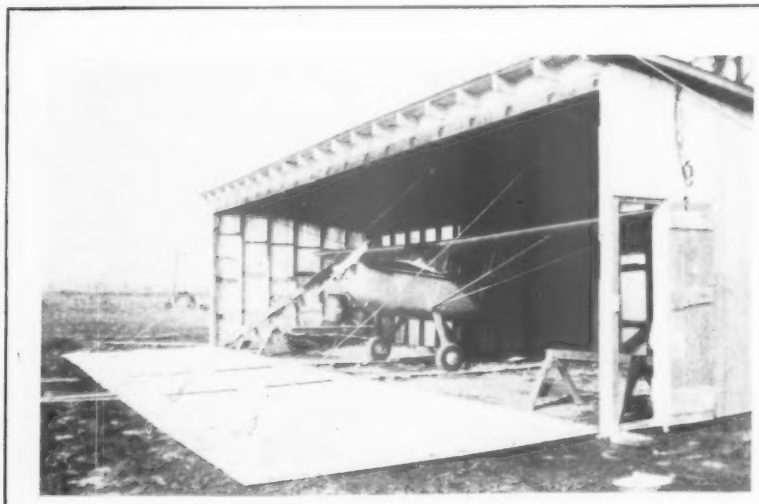
I found aviation gas available at a number of unexpected points. A lend-lease cargo of 90 octane for Russia went down near Port Saunders and the inhabitants gathered and stored many of the steel drums that washed ashore. Bowater's, the largest pulp and paper company on the island, had planes making aerial photographs of their timber limits during the past few years and gas was available at some of the company's depots.

It was reassuring to look down on the thousands of lakes sprinkled over the island. A pilot is rarely without a choice of a dozen lakes to settle on in case of motor failure. I had no trouble but I flew with an eye to the main drainages, prepared to hoof it down a river to a seashore settlement if I had a forced landing. Carrying a day's rations and flying in bush clothes, I was prepared to reach a settlement within two days from any point over which I flew.

An advantage of flying to the salmon rivers is the ability to fly over the quieter pools and locate fish lying in them. Having spotted the fish and their exact locations in the pools, I was better prepared to fish the rivers.

Atlantic salmon lie only in certain pools where the water is deep enough to give adequate safety, where there are eddies and where certain other requirements (known only to the salmon) are met. There may be three salmon pools in one mile of river or there may be three miles or more without a single pool. The number of pools is definitely limited. And the number of anglers that can enjoy salmon fishing is limited, too. Only in wilderness streams is top-flight salmon fishing open to the first comers. A river provides good sport for just so many rods, the saturation point is easily reached. To fish a fresh river at the peak of its run is a privilege granted to few.

For salmon fishing, a trout or bass fly rod will do, but you'll need a reel with at least



HANGAR ON SKIDS

SECTIONAL T-hangar on skids was designed by Ralph and Evelyn Farley, flying farmers of Princeton, Ill. The Farleys live on a rented farm and can have no permanent landing strip because it is rotated each year with the pasture.

But they like to keep their Cessna under a roof, so they devised the hangar pictured above. It is built in two sections, both on drags made from 4x6-inch lumber. The studdings are 2x4s and the rafters 2x6s. The hangar is covered with aluminum sheeting.

Two doors, each hinged at the bottom, cover the front of the hangar. They are closed by ropes wound around a gas pipe which is turned with a wheel in the hangar. The roof is supported by two cables fastened to the front and running up over two 4x6s and down to an anchor on the ground. Each cable has a turnbuckle which can be tightened if the roof sags. The hangar moves easily with a tractor, and can be set up in a half day. It cost $530, including labor, and has already been moved once.

BIGGER, MORE USEFUL; SAFE, FAST AND RUGGED

HERE'S THE BEAUTIFUL new 1948 *Ryan Navion* in Catalina Tan, one of four brilliant enamel colors now available. Among other new features in 1948 are draft-free ventilation, improved interior styling, perfected sound insulation and a new, improved fuel system. Many mechanical refinements have been made in plane, engine and propeller.

PLENTY OF LEG AND ELBOW ROOM for 4 passengers and their baggage in the *Ryan Navion*. Seats are removable to hold 645 lbs. of cargo in 55 cubic feet, easily loaded by removing canopy. Leg room is 50 inches in front and 40 inches in back. Elbow room is 42 inches, and baggage compartment holds up to 180 pounds in 20 cubic feet of space.

IN AND OUT OF SMALL FIELDS with the greatest of ease! You never believe how easy it is to fly this big, fast plane until you actually try it yourself. For illustrated booklet and a free trip in the *Ryan Navion*, write us on your business letterhead. We'll have our nearest dealer put a *Navion* at your disposal for a business or pleasure trip.

NAVION LOGICAL NEXT STEP FOR 2-PLACE OWNERS

Actually much easier to fly than many 2-place planes, the new 1948 *Ryan Navion* is the ideal next step for the small plane owner who recognizes the need for top cross-country performance and real business-plane utility.

The 1948 *Ryan Navion* has not sacrificed ease of flying in order to obtain its 150-mph speed or its roomy 4-passenger comfort. Its interconnected ailerons and rudder give an optional coordinated two-control system, assuring stability and relaxed flying even in rough air. Unique all-around visibility makes every maneuver...in the air and on the ground...easier...safer.

The *Ryan Navion* is designed to "go places" *fast* and to land you wherever business or pleasure requires. Hydraulic flaps, sturdy tricycle landing gear with oversized wheels and tires, and the large steerable nosewheel, assure efficient operation from short, rough fields, even in strong cross winds. The powerful 185 hp engine gives the *Ryan Navion* a climbing rate of 830 feet a minute, and normal range of 500 miles. The new optional auxiliary tank gives it a maximum range of 750 miles.

Safety and dependability are built into the *Ryan Navion*; its thick-skinned all-metal ruggedness means not only extra strength but permanent beauty and ease of maintenance.

Owners seeking the best will find that the new 1948 *Ryan Navion* has blended together all the characteristics most desired in 4-place planes, no unbalanced extremes in performance have been sought at the sacrifice of other important qualities.

The Thoroughly Proven Post-War Plane *Ryan Navion*

Rely on Ryan RYAN AERONAUTICAL COMPANY • 106 LINDBERGH FIELD, SAN DIEGO 12, CALIFORNIA

100 yards of backing in addition to the fly-casting line. Leaders normally taper down to .013 in about 12 feet, longer for low clear water. Salmon flies, both wet and dry in sizes 12 to 2 are needed with 6's and 8's best under most conditions. Waist waders are preferable, but hip boots will do. And you should take your own sleeping bag.

Most Newfoundland rivers are small and intimate, much like the larger U. S. trout streams. But you'll want a guide for salmon fishing. Salmon don't lie in spots normally frequented by feeding fish. They stop feeding when they re-enter fresh water on their spawning runs and rise to a fly only out of whim or annoyance. A good guide, who knows salmon fishing and who has seen the river in all stages from flood to summer low, is the best investment a salmon angler can make. Guides are usually available in settlements near rivers.

Although the Atlantic salmon is a finicky fish, rising only occasionally, the eastern brook trout or squaretail feeds in fresh water and is easier to hook. Regulation trout flies—wet, dry and streamers—are in order with streamer flies being most effective on the larger fish. Trout near salt water usually feed at sea. Like salmon, the sea-running trout make an annual return to the rivers, but the season varies with the river and the particular year. Trout are more plentiful than salmon and are found near inlets and outlets of most of the lakes.

Nearly everyone associates Newfoundland with fog. Just north of the Grand Banks, where fogs are created by the cold Labrador current meeting warmer Gulf stream waters, Newfoundland's entire south and southeast coast have their share of fog during late May, June and early July. The northern and western parts of the island are relatively fog free, having only five or six days of fog in a normal summer. Fog wasn't a serious problem for me; the winds and dark water worried me more.

One day I took off about two hours after the fog had cleared and headed in the direction it was traveling. I found that I had miscalculated and my destination, Lomond, wasn't open yet. Flying over the Gulf of St. Lawrence I got down to zero visibility about fifteen miles short of Lomond and turned inland to sit down and wait. Selecting a pond on the level muskeg, I checked carefully for rocks and snags. Seeing none, I landed. When I'd drifted well downwind so that I'd be in good position for the take-off and close enough to shore to judge that my 50-foot rope would give me a good grip on the bottom, I chucked the anchor over. It hit the water with a splash and lay there, gleaming, just about 15 inches under the surface. Many of the northern lakes have waters stained dark from peat, and the black peat bottom gives the impression of bottomless depths.

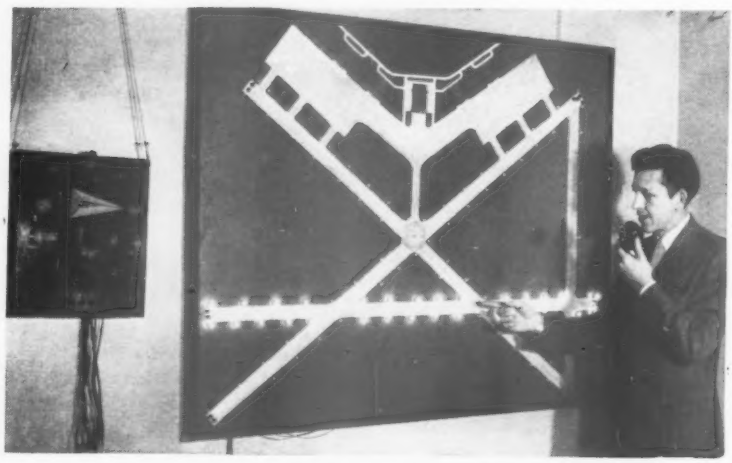
Newfoundland is surrounded by water and it's windy. I made only two slick water landings all summer. And the wind blows hard. One updraft took charge of me at about 2,000 feet and whisked me up another 500 (too close to the overcast for comfort) while I was diving at an indicated air speed of 100 m.p.h., prop idling. The wind baffles in around mountains that line the fiord-like bays. I remember seeing patches of water where the wind was shooting down to the surface vertically and spreading out to all points of the compass like a rosette. A good many times I set the nose into the wind for a take-off and found the breeze on my quarter or behind me before I was airborne. Returning to Lomond one evening, I checked the wind by looking at the smoke from chimneys in the village. From three chimneys in a straight line about 75 feet apart, the smoke was blowing northeast, southeast and southwest, respectively. However, the hazards could not have been too great or a pilot of little experience could not have flown safely, almost daily, throughout the summer.

Because of the J-3's limited range I made my first Newfoundland landing on a pond at the U. S. Army base at Stephenville, where only emergency landings are ordinarily permitted. Gander Airport has seaplane facilities on Gander Lake. It is Newfoundland's air headquarters; but Corner Brook is the logical port of entry because the mountain range along the west coast gives it better scenery, it is closer and it has better weather. Corner Brook has a customs office, buoys and a float—and aviation gas is available. The float is located at the pulp and paper mill, which means there's a certain amount of floating pulpwood to avoid. The town has good tourist accommodations and can be used as a base for trips to more remote sections of the island. Lomond, 50 miles to the north, has good accommodations (Killdevil Lodge) and the water is considerably smoother. Arrangements must be made in advance for gas supplies.

My return was across Nova Scotia, which is a shorter route than that around the north shore of the Gulf of St. Lawrence. I found seaplane bases operating on Waverly Lake, 11 miles east of Halifax, and on a lake just north of Yarmouth. Leaving Stephenville at noon I entered Canada at North Sydney, spent the night at New Glasgow and reached Yarmouth the next noon. Two foggy days were devoted to fishing the tide rip at Wedgeport, where I caught three tuna ranging from 484 to 685 pounds. Clearing customs at Yarmouth I flew across the Bay of Fundy to re-enter the U. S. at Eastport.

Newfoundland is tops for the flying fly-rod angler, a beautiful and rugged country for the camper and a cool spot for anyone's summer vacation. In the fall you can hunt moose and caribou and a seaplane will reach the best hunting grounds. Non-resident licenses for salmon fishing and big game hunting are $25 each for the season. Two-week or daily salmon licenses are available at proportionate prices. No fishing license is required for the trout streams or for fishing the salt water.

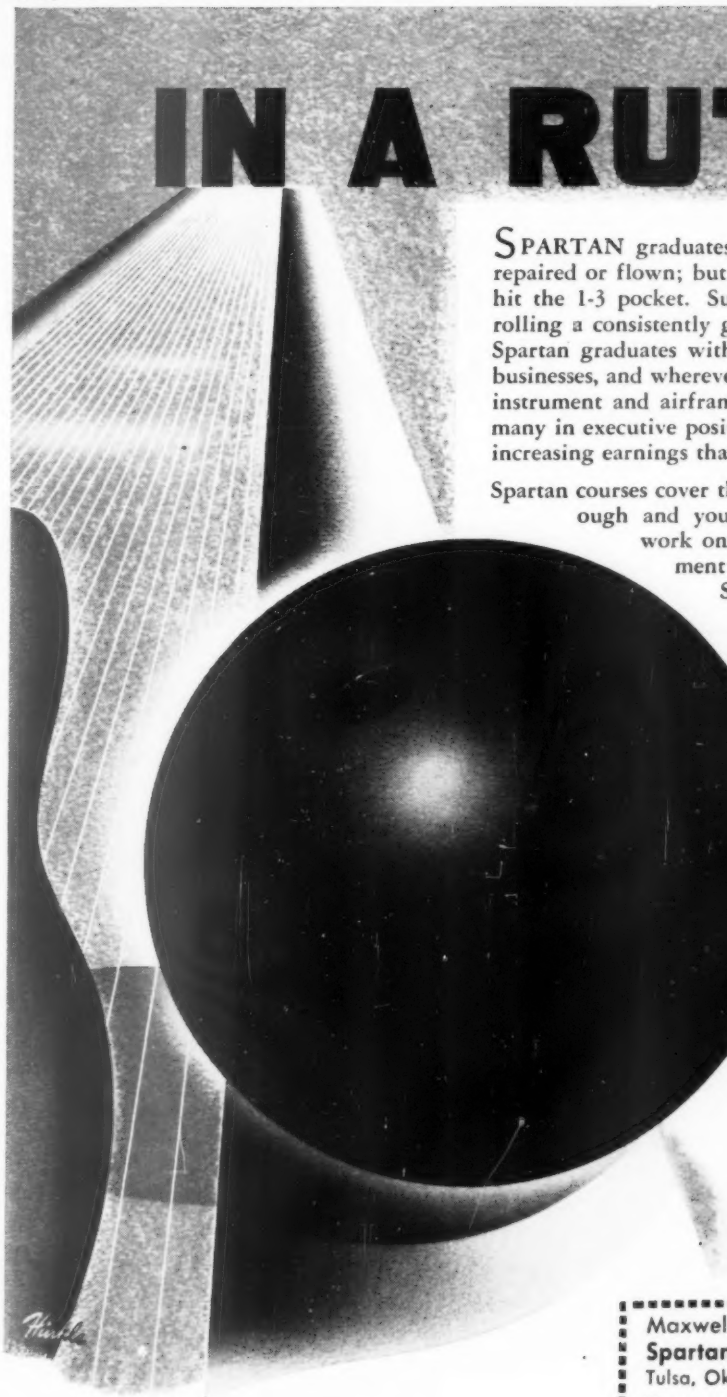
Settlements are scattered around the Newfoundland coastline and along the 540-mile narrow-gauge railway that arcs across the island. The interior is uninhabited except for the American Smelting Company mine at Buchans and a few logging camps. Though there are few suitable places for tourists to stay in style on the island, there is always a haven for the traveler in its friendly villages. END



RADIO-OPERATED LIGHTS

A SIMPLE radio device which would permit pilots to switch on landing lights installed at unattended airfields has been developed by Achilles Corcanges, Mineral Wells, Tex., a former Air Force major and radio expert. The device would require only that the field be equipped with a small one-tube radio receiver to serve as a relay, and a coil to control the signal—which could be voice, continuous wave, or any type emitted by radio or radar. If the field had multiple runway lights it would also need an inexpensive multiple-runway switch synchronized with the wind tee.

The plane itself would need only a radio transmitter or a "spark gap." A pilot approaching an unattended airport would set his radio on a specified wave length for airport field lights. He would speak into his microphone and the lights would flash on. Other triggering methods could also be used.



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Is "Omni" Best for Aviation?—Yes

(Continued from page 16)

weight consistent with the carrying capacity of small aircraft. Several of the leading radio manufacturers have assured CAA that, given a market that will permit manufacture of receivers in quantities of several thousand, they can produce a unit meeting the requirements of private flyers for a price of $200 and at a weight complete of less than 25 pounds. This receiver will combine in a single equipment the following three important functions or services:

1. En route navigation by merely watching a course meter along any desired track toward or away from a VOR station.

2. VHF voice communication reception from airway stations, VOR's, and control towers.

3. Instrument landing runway localizer guidance permitting straight-in approaches to airports under poor visibility conditions.

The private flyer will get more for his money in the VOR receiver than he now gets in any equipment available to him. A few private flyers are already equipped with the more expensive receivers which are available at present and are enthusiastic about the results they have been getting with the relatively few VOR's currently in operation on a trial basis. CAA does not plan wide scale use of VOR facilities until calendar year 1950, but in the meantime will operate increasing numbers of them on trial as they are installed and commissioned.

One other point in connection with the availability of navigational facilities to the private aircraft operator should be mentioned here. There have been many proposals made in the past several years for the development or adoption of a great variety of radio and radar navigational systems. Without exception, the systems proposed have been beyond the reach of private flyers. The private flyer stands to benefit more from the omni-range program than he would from any other system, either here or on the horizon. In fact, the private flyer has been an important consideration in planning the present program, and is not the forgotten man that he is led to believe.

In the article we are discussing, the impression was created that CAA alone and single-handed is trying to foist their program on an unsuspecting flying public, although it is mentioned that the Air Transport Association and the International Civil Aviation Organization have lent their support. The facts are that, in addition to these organizations, the program is supported by the Air Force, Navy, Coast Guard, Air Line Pilots Association, F.C.C., State Department and Radio Manufacturers Association. The program was recently endorsed by the technical representatives of all these organizations through their participation in the lengthy and serious deliberations of Special Committee SC31 of the R.T.C.A. Bearing all this in mind, does it seem reasonable that the omni-range could be as bad as it was represented in the article, and still receive the approval of the best technical brains in aviation?

Since the accuracy of VOR is the subject of such heated discourse in the article we are reviewing, let us examine the requirements for accuracy established by the technical and operational experts of world aviation who constituted the Special Radio Technical Division of ICAO. The following paragraphs are quoted directly from that portion of the report of the Special Radio Technical Division dealing with accuracy of short distance aids to air navigation.

"Errors of the system shall be within plus or minus five per cent of the distance measured and within plus or minus three degrees in azimuth or one-quarter of one mile (0.4 km), whichever is the greater, when the point selected is located near an aerodrome of indicated landing where air traffic control requirements make accurate ETA's necessary. When the point selected is elsewhere, the error shall be within plus or minus five per cent of the distance measured and within plus or minus three degrees in azimuth, or three miles (4.8 km), whichever is the greater.

"Errors in geographical fixing relative to the ground shall not be greater than the errors permitted in paragraph above and, in no case, shall the error be greater than three miles (4.8 km).

"Errors shall be the sum of all inaccuracies caused by both ground and airborne equipment, up to the point of final presentation in the cockpit. Such errors, on the basis of a normal Gaussian error law, shall satisfy the requirements for 95 per cent of all observations."

Now that we have expert opinion on the requirements for accuracy to guide us, let us see how well the VOR is capable of meeting that portion of the requirements that apply to it.

During the period October 21-24, 1947, inclusive, the Collins Radio Company of Cedar Rapids, Ia., devoted 28¾ hours of flying time in their DC-3 to flight tests "to evaluate the practical performance of the VHF navigation and communication equipments developed by the Collins Radio Company, and to appraise the operational possibilities of the CAA visual omnidirectional range station (VOR)." Flight tests were conducted on the following VOR stations, all of which are operating on a trial basis:

Kansas City, Mo.; Newark, Ill.; South Bend, Ind.; Angola, Ind.; Indianapolis, Ind.; Cleveland, O.; Youngstown, O.; Phillipsburg, Pa.; Sunbury, Pa.; Allentown, Pa.

The portion of their report which summarizes the observed accuracy is quoted verbatim as follows:

"Since all but the very poorest tracks have roughness below 3°, it can be said that the VOR will give the pilot courses usable to ±1° or better nearly all the time without requiring any special interpretation of the indication. Analysis of the recorder charts shows that large instantaneous errors were encountered a very small part of the time, as follows:

	Min.	*Pct.*
Total time when deflection exceeded ±3°	1.5	0.25
Total time when deflection exceeded ±2°	6.4	0.75
Total time when deflection less than ±2°	875.0	99.25

"The 6.4 minutes over 2° are made up of a number of intervals each of short duration."

These data, taken by an unbiased observer, should go a long way toward refuting the isolated and unauthenticated cases of serious errors cited in the article. It is entirely possible that large errors could occur during this period of development of the program, but is significant that those alleged to have made the reports are, like the author himself, anonymous.

The assertion that the omni-range antenna system violates some fundamental physical law is utterly ridiculous. Physical laws are formulated on the basis of observed facts and cannot be "violated." To attribute to CAA radio engineers the ability through "ingenious technical developments — radio

15 YEARS AGO

FROM the June, 1933, issue of this magazine:

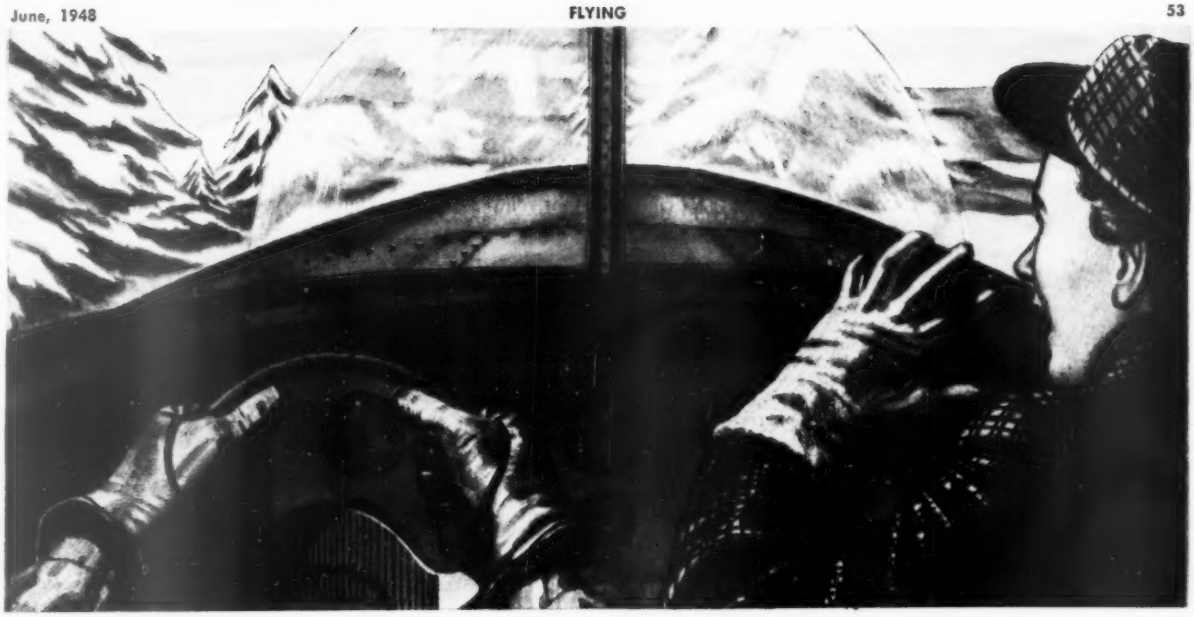
Air-Paddler was the latest type of side-wheeler aircraft developed in Germany. Power was applied to two double cranks driving paddles on either side of the fuselage. The paddles remained in a horizontal position during flight and were driven by a 1,000-h.p. Diesel engine. Estimated forward speed was 300 m.p.h.

Boeing's new low-wing twin-engined transports purchased by United Air Lines, were powered with two 550-h.p. supercharged *Wasp* engines. They carried 10 passengers, a crew of three and had a top speed of 182 m.p.h. Comfort features included a liquid heating system for winter, a cooling system, a wide window at each chair and cabin insulation.

The Swedish Tiger-Swallow, built for advanced flight training, was a sturdy two-seater. Considerable use was made of tubes and sheets of Swedish nickel chrome steel. It was powered by a 250-h.p. Walter Castor I engine and had a speed at sea level of 127 m.p.h.

The new Heinkel transport, designed for Deutsche Lufthansa A.G., was a low-wing cantilever monoplane with a slender tapering fuselage. It had accommodations for seven persons. Landing gear and tail skid were retractable. A maximum speed of 226.25 m.p.h. was recorded on trial flights.

Low approach by radio beams was sufficiently developed by the Department of Commerce for service tests at Newark Airport. The pilot guided his plane by watching the dials on his instrument panel and listening for the signals of the marker beacons through his headphones —basically the present ILS system.



Prayer and Aeromatic® Win Out!

...AIR SPEED BELOW 50...END OF RUNWAY...HILL DEAD AHEAD...

A steep thirty-foot bank of the Yukon River at one end of the field, a high hill on the other and a no-wind condition! That's the situation in which Carl F. Gulley and wife found themselves as they attempted to land on the snow-covered 1500-foot strip at Eagle, Alaska. What happened? Here's the story in Mr. Gulley's own words:

"The terrain was extremely hard to determine when blanketed with solid clean snow, but I knew I should have been on the ground and kept feeling and feeling for it. It wasn't there! Suddenly that hill loomed up just in front of me. By then my air speed was below fifty, and brother, was I panicky! I knew I couldn't make it, and thought of that beautiful plane stalled out in the treetops. But I gave it full throttle, eased the nose up, and prayed. Just as I skimmed over, I breathed a sigh of relief. I had had faith in an Aeromatic before, but that little episode really sold me. I'd sooner lose my main gear than my Aeromatic."

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tricks" to circumvent the laws of nature is a high compliment indeed, although I am sure it was not intended as such by the author.

The "principle" of "large antenna—small error" which was set forth in "semiscientific language" to show that the omni-range is subject to large angular errors is not even remotely applicable to the VOR antenna system. In fact, an antenna designed to radiate the type of field pattern suitable for omni-ranges should be as small in terms of the operating wave length as it is possible to make it. The data quoted from the summary of the Advisory group for air navigation of the Air Technical Service Command ascribing a minimum theoretical error of $\pm 2.8°$ to the VOR, was based on an early antenna having a relatively wide element spacing. Since publication of these data, CAA engineers have succeeded in reducing the effective spacing of the antenna, and have thereby reduced the antenna error to less than 1°. This is exactly opposite to the results which would have been obtained if the so-called "basic principle of physics" had governed the situation.

To illustrate the absurd results which we may expect to get if we go about blindly applying mathematical formulae to problems in which they are not valid, let us consider the case of a loop antenna such as that employed with the aircraft automatic direction finder. At a frequency of 300 kc. per second the ADF loop has a diameter of something less than .003 wavelength. Applying the "physical principle," to which our author ascribes general validity, we would expect that we might encounter an error in using our ADF as great as 57° divided by .003 or 19,000°. Shall we discard the ADF because it violates a "fundamental physical principle" in spite of the fact that it has been giving us bearings accurate within about a degree for a good many years? It would certainly be confusing if we were to some day get an error of 19,000°.

There are several ways in which navigational lines of position can be conveniently established by radio. The information which the pilot wants is his bearing and distance from some known fixed point. This the omni-range-DME combination gives him directly. Other navigation systems furnish position information in terms of two distances, two bearings, or with reference to a lattice of intersecting lines. Most of the lattice systems are extremely accurate, and the two-distance system as embodied in Shoran is the most accurate one known. In fact its accuracy is of the same order as that of our best surveying methods. If it were accuracy alone that we were after in air navigation, Shoran would win out hands down, and yet no one has seriously proposed it as an aid for civil flying. Why? The answer is that while it is supremely accurate, it is not convenient to use and does not give the pilot the information that he wants in straightforward and direct terms as does the VOR-DME combination.

It is almost axiomatic that a reasonably accurate navigational system that presents its information in terms of quantities that can be assimilated and used without interpretation is operationally superior to other systems having greater accuracy but being cumbersome to use.

The "basic principle of physics" which our anonymous author describes in pseudoscientific language, would make some sense if it were applied to wide aperture antennas such as those employed in radar work. In radar it is essential to concentrate the radiated energy in a narrow, well-defined beam. To do this, it is necessary to use an antenna having dimensions which are large in terms of the operating wave length. The larger the antenna, the sharper the beam, and in general the greater the resolution and accuracy of the radar set. Suppose, for example, that a radar antenna had such dimensions that it radiated a beam having a horizontal width of 3°. The only region in which a target could be found would be within this 3° sector, since there is no signal radiated in the remaining 357° of arc. The probable error of locating a target within the 3° sector could be roughly determined by applying our author's basic "physical principle" (which is in reality a diffraction equation) to the antenna system.

To provide 360° coverage with a radar, it is necessary to rotate the antenna, and since it must be a relatively large structure, it cannot be rotated at a very high speed. Therefore, the information gathered by the radar is intermittent in character. The omni-range also employs a rotating field pattern, but to serve all directions simultaneously and continuously, a broad pattern and a very high rotational speed are required. The omni-range pattern is, therefore, rotated electrically rather than mechanically as in the case of the radar. It is little wonder that different antennas must be employed for these two different jobs, and that criteria which may be applied to one just won't fit the other. It is surprising that anyone who could be called an engineer would have armed our anonymous author with so much misinformation.

The effect of errors in the omni-range system upon traffic separation has been treated in the same loose, inaccurate and uninformd manner that characterizes the entire article. A horrible example is cited, based on "another report of an early test," wherein an aircraft descending from 3,600 feet to 1,500 feet finds itself in the immediate vicinity of another aircraft which should have been eight miles away but wasn't because of VOR errors. It should be quite obvious to anyone who would give the matter a little thought that errors in an omni-range station would be common to all aircraft using the station, and would thus have no effect on traffic separation. This self-evident fact was ignored by our author's engineering authority who analyzed the situation so inaccurately for him.

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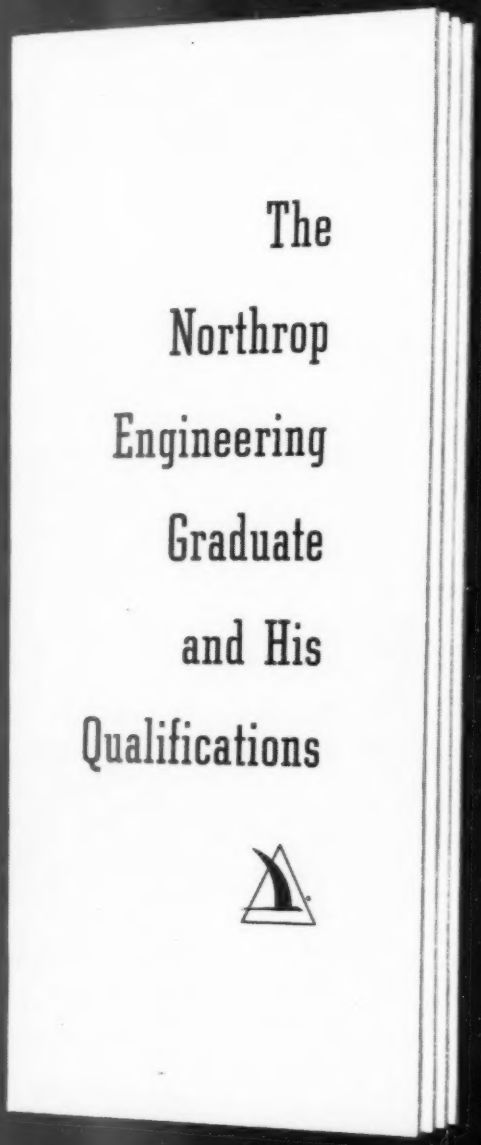

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The author apparently takes off on his own without benefit of engineering advice in jumping to the conclusion that bearings taken on a VOR are always uncertain within 4°. A CAA publication is quoted as authority for this. The facts of the case are that, in using the VOR, course deviations are indicated on a zero-center meter. The meter remains centered as long as the aircraft is exactly on the selected course, and deviates from its central position to the left or right, as the aircraft deviates to the left or right of the course. It has been found that a full scale deflection of the meter for a 10° departure from course is about the right sensitivity to use. The meter may actually be read to much better than 1°. The CAA article was intended to point out that there is little practical need of pursuing a course closer than about 4° or ±2°, so that if the meter pointer is within these limits, the aircraft can be considered on course. If someone wanted to work himself to death and stay on a selected track to a closer tolerance, the indications are there to enable him to do it.

It was interesting to learn by reading the article that DME gives accuracy of 500 feet at all distances up to 50 miles." Here is something we would like to learn more about. About a year ago CAA let a contract for the procurement of a number of DME equipments, both airborne and ground. The best accuracy figure we could get any manufacturer to quote on was ±3% of the distance, or one-half mile, whichever was the greater. We confidently expect this performance to be exceeded and improved with time, but we would like to know where to buy the equipment with 500-foot accuracy now. Perhaps our author's staff of scientists and engineers will tell us.

So much for the article itself. I could go on and on pointing out errors, and untruths in practically every paragraph in it but no purpose would be served by so doing. I think that it has been shown that the basic theme of the article is founded on a misconception and its arguments are invalid.

No one could object to a criticism of the omni-range on valid technical grounds. Like all devices, electrical or mechanical, it has its faults and weaknesses that are open to criticism. In spite of all the uninformed gum-beating on the subject, the omni-range will emerge as a valuable aid to private flying and other phases of aviation alike. END

Can We Have a Universal Vehicle?

(Continued from page 31)

everybody, so that even his own workers could own one, the market would not be big enough even to build a good car.

Once the cheap Model-T developed the public desire and satisfied it with a vehicle that would run (some of the time) then came the era of production of low priced (not cheap) cars that *did* run, and gave the greatest value per dollar of any product in the world.

It was thus that the motor car industry developed a *standard product* with universal, world-wide appeal and within the price reach of 10,000 customers a day. They see no need to change that product today as long as they can sell more than they can build.

"Production" to them is not 10 a day or 10 an hour. Automobile production today is figured at *not less than 1,000 a day*, so that the necessary tools to enable the parts to be made cheaply can be kept busy all the time.

We in aviation have committed the sin of "hand labor." Tradition has held us to "building" *cheap* planes by hand with very small value for the money except that they fly. But with the *cheap* plane we have built no market, and still stay a 50-a-day industry at best.

We must change our entire assumptions as to what a private owner vehicle should be.

The private-owner plane is not made in large enough quantities to be built by tool and production methods. Our present 1935 outrigger designs are still bench jobs—tubing, welding, sticks, and what not.

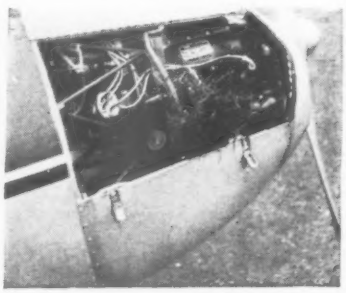
More vises and files than presses or automatics!—and the best of these cheap types, though usable, are not nearly the money's worth you get when you spend a like amount for a car, a refrigerator, or any quantity-produced product.

Several air firms have tried the production system, however, with extensive tooling (as the airplane industry understands it), but all have come to grief. They did so because *there are not enough customers*—not enough public *desire*—for the present type of airplane.

The motor car people got their design standardized; and at last all models have virtually the same arrangement and design except for chromium bars.

But their designs are set and will be as long as desire keeps the production lines going—and rightly so. Why change when you can sell more than you can make?

When the public finally demands a new type car, production lines of these old cars will be as lonely as the Model-T line in its last desolate year.



HITCH-HIKING SWALLOWS

EVEN BIRDS like to take a free hop occasionally, judging from pilot John R. Barron's experience at Algonquin Park, Canada. Entering through a radiator grill, a pair of swallows built a nest in the engine compartment of his Cessna 140. Without inspecting the plane carefully, one of Barron's friends made several flights with the "hitch-hiking" nest. Result: coddled bird's eggs and a disillusioned pair of swallows.

And so the railroads, the motor car, radios, washing machines, refrigerators and what not are all very happy with unheard-of-demands for their useful and utilitarian products. And these industries are creating money for labor and the surpluses are going into taxes and luxuries that none but the very few ever enjoyed before, all because we found out *how to make things both good and cheap if everybody wants one.*

But in our airplane business we wail that something is the matter: We should be subsidized by the Government. (Who is this Government?) Or some Foundation should put up the money for something to save the business.

We have our standard models; we have our instant deliveries ready—but the public has quit buying and we know why.

There is little or no *utility* to the present private airplane. It's a pleasure vehicle—in a few cases useful but mostly fun—and too expensive for fun.

The first requirement of an air vehicle must be *utility*. It must be widely useful—useful not just for one thing, but for the greatest possible number of things.

What I have in mind is *THE UNIVERSAL VEHICLE*—an idea that goes further than our imaginations have been able to reach so far.

Think what would happen to our sales if we could offer a vehicle as useful as a motor car! Think further as to the sales field, with a vehicle more universal than the motor car and no more expensive to operate! Let's at least dream high and then see how near that goal we can reach with our present mechanical material.

If we are going to build this universal vehicle we must first determine what is wrong with what we have.

It is obviously silly to carry along a 100-h.p. engine to *fly* the ship, and then be totally unable to use that power in let down to cut our landing space and speed.

It is obviously dangerous to have the response of our controls— elevators, ailerons, rudder,—depend on the speed at which we are going.

When we are going slow is when we need them!

All controls eventually must be *power controls*, using all the engine has in it, if necessary, to keep the ship under control.

Today, we make planes land slowly by having big wings and light loads per square foot. This does one thing but undoes several more. The plane floats and is hard to bring down where we want it. Worse, it bounces us about like a cork when the wind is gusty. No springs.

What! Springs on the wings?

Waldo Waterman did it and flew the ship from California to the Cleveland Air Races. And it worked. Smooth riding. It is the germ of an idea. The birds do it

THANK YOU!

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March 10, 1948

Mr. O.D. McKenzie, President and General Manager
Aero Industries Technical Institute
Oakland Municipal Airport
Oakland 14, California

Dear Mr. McKenzie:

In my capacity as Quartermaster-Adjutant of the Department of California, Veterans of Foreign Wars of the United States, I personally vigorously supported National legislation which set up the present educational benefits for veterans of World War II. Because of this activity I have personally interested myself in the administration of these laws, in an endeavor to safeguard against abuses which could readily bring about a revocation of the same. This interest necessitated a personal tour of many of the private schools certified by the State Board of Education for G.I. training.

Recently I had the pleasure of visiting and inspecting the Aero Industries Technical Institute located at the Oakland Municipal Airport, a training school headed by yourself. In utter candor I must say that I was amazed at what I saw. The modern training equipment and whope used in your outstanding engineering and mechanics school, the meticulous interest of your instructors in the training of the men enrolled, and the thorough detail of instruction in the aviation industry compel me to recommend without hesitancy to veterans desiring such training, the facilities of your school.

The opinions of officials from the Civil Aeronautics Authority who toured your school at the same time as I made my inspection confirmed my impressions. I therefore heartily congratulate you for the manner in which you are conducting this amazing training establishment.

Sincerely
M. C. Hermann
M. C. HERMANN
Dept. Quartermaster-Adjutant

MCH:CM

MARCEL C. HERMANN

Marcel C. Hermann is a veteran of World War I, having served with the 27th Infantry in the capacity of Regimental Sergeant Major with the Siberian Expeditionary Forces. For twenty years he has been actively engaged in the work of veteran organizations, and for the past ten years has served as Quartermaster-Adjutant of the Department of California, Veterans of Foreign Wars of the United States. His interest in veterans, and his forceful prosecution of legislation for veteran benefits is known nationally.

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F-6

so it has some fair precedent.

But we want quicker take-off and straight-up-and-down landings.

Cut down your aspect ratio. You can get a climb at 45° and come in the same way, but what happens to the ceiling, the power requirement and a dozen other things? Yet, it is an idea!

We have gotten together a lot of puzzle pieces in this aviation business—some of them forgotten for a long time—but each one may fit into our cut-out puzzle somewhere so let's look at more.

Castering wheels! Bleriot had them in 1908.

Four-wheel landing gear. Wilbur Wright had that in 1907.

Flexible wings. Paulhan and Caudron had them long ago.

No good? How do you know? We only know they neither knew how to use them or just what they were for.

And then there is this autogyro-helicopter thing.

Its wing aspect ratio is one and it can climb fast as a plane. With power enough it can go straight up.

Its wings are already going 300 m.p.h. and it hasn't any reserve speed left. No, the helicopter will never be the universal vehicle but it is worth more study. As a matter of fact, it is a rotating-flapping-wing machine.

And there have been a lot of flying machines from the beginning of time built to "look like a bird." They are inventors' machines, built on belief and hunches, wish and pish, and from Icarus to Darius Green their efforts only created laughs.

Only when Wilbur Wright, with the help of Octave Chanute, and Dr. Spratt with his wind tunnel, brought out some research facts as a basis for their ingenuity, was a machine made that flew.

It flew and that's all.

All the improvement since has come from the discovery of facts one by one—the law of the movement of air, and of the strength of structure; information on the preparation of stronger materials, better engines, improved fuels. . . .

And with it came new instrumentation; real wind tunnels and the balances that could record facts; the stroboscope to watch fast things move slowly; the oscillograph, and a thousand tools supplementing the eyes and senses and brains of man.

These were machines to find out facts and we have learned more of these laws of the Creator in the past decade than in all man's history before. In the next few years we ought to learn even more.

And these facts are there for the using and to interpret into new things as well as the old.

Not long ago a novel machine was tested by one of our big firms as a result of experimenting a lad had done by himself down on Chesapeake Bay. He built himself a flying boat. Its chief merit was that the machine was based on totally new assumptions and for that reason alone a newspaper clipping describing his flights with a machine which had no tail, no rudder, no ailerons, interested me enough so that I wrote and asked him to meet me in New York.

He had photos and movies—and the damn thing flew!

The whole machine weighed 750 pounds dry. It had a 20-foot wing span and a five-foot chord. The wing was pivoted on one bolt. Instead of ailerons, he tipped the wing on a 40° angle and literally flew only the wing. The body hung below exactly as on a helicopter only this wing was fixed, not rotating.

It had a 65-h.p. Continental engine up front. The propeller—five foot diameter—(enclosed) was at the rear, driven by a 12-foot ¾-inch shaft of drill rod. The boat was framed of steel tubing and covered with ¼-inch plywood except for the bottom.

The owner had never learned to fly but he took it off and flew it for 100 hours. He carried two passengers on this 20-foot wing.

The boat took off with one occupant in smooth water in 10 seconds—I timed it myself later.

It had no pedals but just a wheel, like a car.

The inventor, George Spratt, called it a controllable wing plane. It was the last of a series of some 12 models he had built at his own expense.

We took George over and he started on his millenium of luck—everything to work with.

Designers came from all directions. They spent months on the mathematics of the shaft, (his cost $4.98) and improved it to a cost of $2,500 and twice the weight. Also it failed after 12 hours flying, for they had used engineering instead of thinking.

The 70-pound wing was *improved* to 250 pounds, and cantilevered for high speed.

It was bad to carry the weight of the plane on the control wires, so they were led around 14 pulleys to get where they were going.

The engine was put in backwards so that the air was scooped in—sent up forward through the engine and then reversed again to get out.

Finally, 120 pounds of recording instruments and cameras and the like were put in the co-pilot's seat to help out the test flight.

Well anyway, after a lot of fussing it really flew and had about 80 hours of test at various bases. Bob Townsend took it up first. It scared him stiff for an hour and by then he was delighted. His report was favorable. Then came more pilots, professional test pilots, and they said the same thing but that it did not feel like an airplane.

Finally they found a pilot who said it was no good—and he was right, for that particular model wasn't any good. And George went back home to build another one on his own, and as he wanted it.

When it comes out I'll bet it will be usable and well worth study.

It is small enough so that the wings can fold. With a proper chassis it can be made into a car. I don't just know how but some guy not too smart will do it before long. (The "smart" ones will still be working in the engineering department of some firm calculating vibration nodes.)

Then there was the tailless machine that Waldo Waterman built. He drove it about Santa Monica as a three-wheeled car, put wings on it at the airport, and had a usable plane. He built several for the Studebaker Corporation with their automobile engine and, believe it or not, John Geisse flew one from California to Washington before he knew what compass variation was.

Several firms recently have built roadable planes that leave their wings at the airport. But that is not enough. The public will not buy a wing that comes off. The wings must be available at all times.

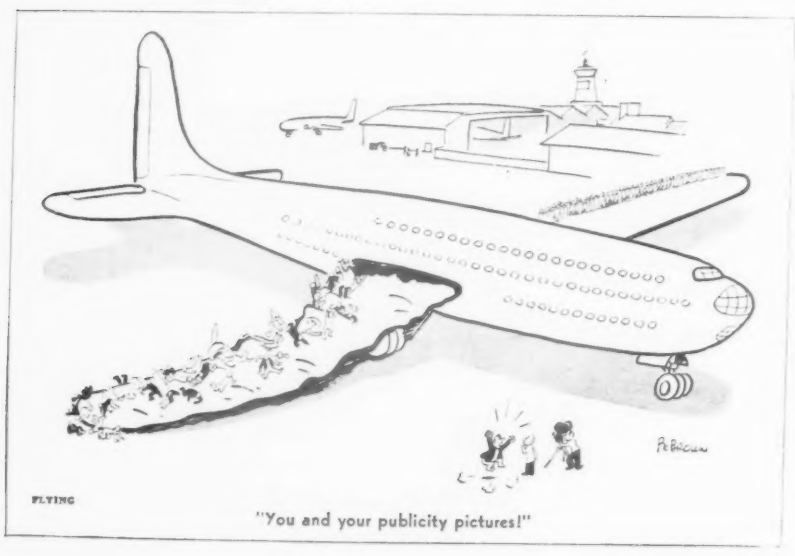
They must travel *with* the vehicle on the road just as the car must be with the plane in the air.

Don't think that this is knocking the men who are working for a roadable airplane. After all it must start somewhere. I am only pointing out that it is not the ultimate and it will not sell to 1,000 customers a day.

A roadable airplane must have smaller dimensions than present craft and that step alone will mean something.

In another article I will list a number of planes we have experimented with and flown—each with good points—and all with bad. Each taught a lesson mostly of what not to do.

END



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JUNE
1948

AOPA Pilot

AOPA NATIONAL HEADQUARTERS, WASHINGTON BLDG., 15TH AND N. Y. AVE., N.W. • WASHINGTON 5, D.C.

An Editorial:

AS THIS goes to press, D. W. Rentzel, president of Aeronautical Radio, Inc., is about to be confirmed by the Senate as President Truman's appointee to succeed T. P. Wright as Administrator of the Civil Aeronautics Administration.

Rentzel has been a private pilot for many years and is an AOPA member. He deserves everyone's best wishes—and sincerest sympathy. As somebody has said, being Administrator of Civil Aeronautics involves taking a $10,000 job that should pay $50,000—plus a $250,000 beating.

AOPA officials have had many dealings with Mr. Rentzel. He has served on a number of government committees concerning aviation radio. He knows what he's talking about. He is fair and—insofar as his former connections would permit—was not unfriendly to the problems and needs of lightplane pilots.

On the face of it, those connections might color his fairness in his new post, because he is, and has been for a long time, representing airline interests. These interests, too often, have opposed progress in the lightplane field. They will be the first to greet Mr. Rentzel at his Administrator's desk, and many of them are old friends and colleagues.

A public office is a public trust. We are convinced that Mr. Rentzel is thoroughly aware of this and, if anything, will lean over backwards in order not to betray that trust by becoming an "airline Administrator." We predict he will without bias "call the shots as he sees 'em."

All we can add is, it's going to be tough—it's going to be very tough. We wish him the best of luck and will do all we can in the months ahead to make it less tough wherever possible.

TOMORROW'S NEWS AND AOPA

RTCA Program

The vital importance to lightplane flying of the program now abuilding by the Radio Technical Commission for Aeronautics was underlined recently before the Commission's general assembly by J. B. Hartranft, Jr., AOPA general manager.

Either electronics for air will lead to a healthy and growing lightplane industry and personal flying will become a permanent part of the nation's transportation system, or individual flying can be wrecked by RCTA's program, he indicated. He said in part:

"Until the advent of VHF, the private flyer was able to navigate his airplane, to communicate with ground stations, to obtain weather and airways and airport traffic-control information by the simple expedient of purchasing a low-cost transceiver by which air-to-ground communications were transmitted on 3105 kc., and a tunable receiver brought him his navigational weather and communications information on ground-to-air channels roughly between 200 and 400 kc. This single-unit equipment could be purchased for $150 or less, weighed less than 20 pounds and required little or no alteration to aircraft for installation. In other words, a maximum of one-tenth of the value of the lowest cost aircraft was invested in radio-navigation equipment.

"The first major transition required of private pilots under the RTCA program is now in progress. It is the addition (or the substitution) of a five-channel airborne VHF transmitter. These five communications channels are intended to provide under the RTCA report all of the communications required by the private pilot during the interim period.

COST A FACTOR

"The problem of private aircraft VHF air-to-ground communication is, except for the matter of cost, virtually solved. Transmitters are compact, light weight, and easily installed. Also for those who desire to economize, VHF transmitting equipment is now available on the market which may be conveniently plugged in to make use of the power supply source of low-frequency transmitting equipment that may already be installed, thereby saving the private air-craft owner roughly $150 and, at the same

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time, giving him the continued use of 3105 kc. as an auxiliary transmitting channel.

"The current picture with respect to *ground-to-air* communications, that is, VHF airborne receivers, is not too encouraging, and manufacturers will have their first test of ingenuity in producing for the private flyer immediately and for the interim period a tunable receiver ranging from 108 to 136 mc. which will provide for both aural (communications) reception and visual presentation of the omni-directional radio-range signals for navigational functions.

NEW EQUIPMENT NEEDED

"The fact that 66 omni-directional radio-range station sites have already been selected and equipment installed, as of February 29, 1948, and that funds for a total of 465 stations have already been authorized, gives undisputable support to the need for manufacturers' concentrating upon the *whole* problem rather than being satisfied in solving the easier of the two halves which, in effect, may solve nothing at all. This is true because there is no *absolute* need for VHF ground-to-air communications for private flyers as long as the low-frequency radio-range communications channels are available. When the LF frequencies are no longer available, the navigational function of the low-frequency radio ranges will not be available either, which means that omni-directional radio ranges *must* be operating and private flyers must have airborne equipment capable of permitting satisfactory navigation in flying by the omni-range. Hence it is obvious that there is little to be gained by the design and marketing of a VHF communications receiver alone except for the static-free ground-to-air communications which are a virtue of VHF transmitting frequencies.

"Private flying interests seem to agree, however, that expenditure of funds by a private pilot for a purely *communications* VHF receiver is not desirable, as such equipment would become obsolete at a very early date and, in fact, as soon as a "combination" VHF receiver is made available which would provide the navigation and communications functions in a single unit.

"Thus, in the interim system, the private flyer will require a VHF transmitter, which is now available, and a combination VHF navigation and communications receiver, which is not yet available. RTCA recommends in the SC-31 report that immediate attention be given to the problem of a private flyer's navigation and communications receiver and has invoked one of the "checks and balances" by stating that the LF range system shall not be decommissioned until, and I quote 'a low cost, light weight, VFH navigation-communications receiver is available.' It is, of course, desirable that these new VHF transmitter-receiver combination equipments be combined into a single box in the same manner as contemporary LF transceivers.

RTCA CHALLENGED

"This, then, is the first real challenge to be met in the RTCA interim program, and it is upon the resourcefulness and ingenuity of the manufacturers that we must depend for achievement of these miracles in engnieering and production.

"Perhaps most vital to the private flyer in the evolvement of the RTCA program is the need for continued coordination. To achieve this, RTCA has recommended that a steering committee be established. RTCA has gone beyond this in their endeavor to insure a balanced and co-ordinated program by indicating further that industry should have an equal voice with that of Government in monitoring and directing the development of this program.

"If the recommended steering committee can operate with the same balance of interest which has assured the success of RTCA, a well co-ordinated program of development, implementation, and replacement will be achieved by industry and Government working with equal voice and in double harness.

PRIVATE FLYING AT STAKE

"Since the private flyers' destiny in this whole picture is so acutely to be determined by the balance with which this program is implemented, we must conclude that the creation of SC-31's recommendations is merely the *beginning* of our answer and that in sober truth the complete destiny of private flying is yet to be determined by the manner in which the implementation is achieved. For instance, if airborne gear for private flyers is not developed as anticipated in the RTCA report, there is obviously no need to install the complementary ground facilities. Or if manufacturers fail to make available specific items of equipment, the whole program will dissolve into a more chaotic condition than we have at present.

"On the other hand, the development of adequate electronic aids for private pilots will undoubtedly increase the utility of the private aircraft and, therefore, the private aircraft market and finally the market for electronic aids themselves. If the RTCA program can start this healthy spiral, it should continue progressively upward with great benefit to *all* aviation interests, for weather is no less of a handicap to private flyers than it is to the military or the scheduled airline operator.

"A child has been born; its future, gentlemen, and by no less means the future of all-weather flying, rests in your skilled hands—an open challenge to your ingenuity, your far-sightedness, and to your infinite patience!"

New Service Bulletins

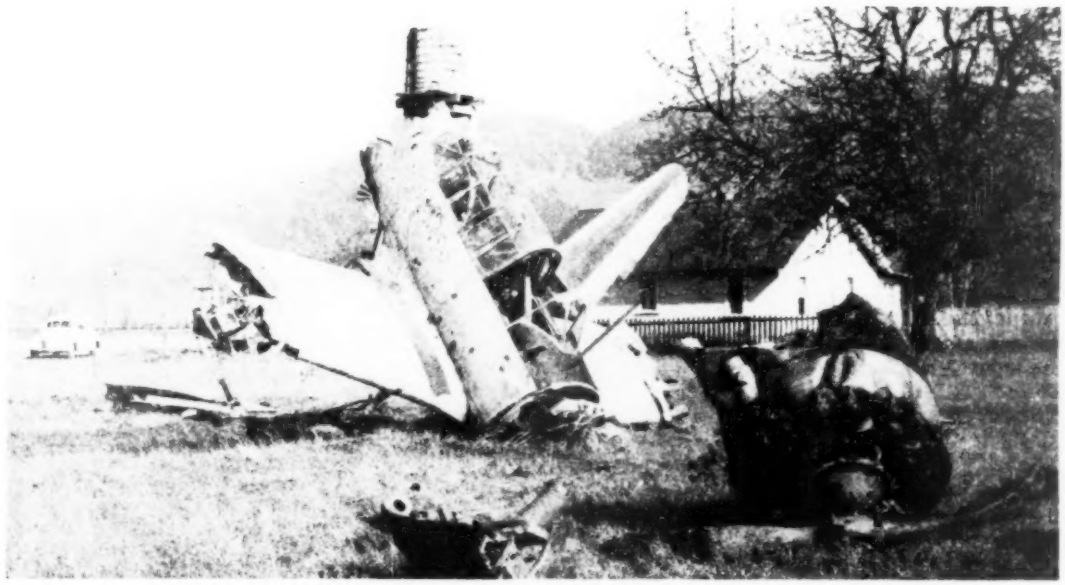
TWO NEW AOPA Pilot Service Bulletins are now available to the membership. One is for the vacationer, No. 16, and is titled "Resort Airports in the United States."

The second, No. 17, is titled "The RTCA Program and Personal Aircraft." For a review of it, see "Tomorrow's News and AOPA" in this issue.

Both can be ordered by either name or number or both from AOPA headquarters, Washington.

KNOW YOUR STAFF

Geraldine Huchison, AOPA's Registrar, has watched AOPA grow from a membership of 18,502 in November, 1945, to its present registration of 44,678. Miss Huchison is not a pilot, but plans to start flying lessons in the very near future.



THE PILOT WALKED AWAY

THE PICTURE above is not what you think, perhaps. From the looks of the plane, the pilot was killed. He wasn't. He walked away with only a couple of scratches.

Why?

Shoulder straps saved him.

Mr. Hugh De Haven, director of crash injury research, New York, has found that a great number of injuries, especially around the head and shoulders, could have been prevented if straps had been used. As the picture indicates, a plane can take a tremendous beating while its occupant survives without injury—if his straps are tight.

The moral is obvious. Avoid accidents—of course. But if by sheer bad luck or equipment failure you get into the switches and an accident is inevitable be prepared to have everything at hand that you can possibly use to save yourself from serious injury or death.

(Prepared by the Aircraft Owners and Pilots Association, in cooperation with the Civil Aeronautics Board and in the interest of safe flying.)

BUILD BETTER PLANES

The comments below were written after the author studied the breakdown of the first 6,000 accidents for 1947 and their cause. They concern the two most frequent causes reported—stall-spin and collisions.

By Russel F. Holdren
AOPA 21251, Pittsburgh, Pa.
Pittsburgh, Pa.

IN THE light of present conditions, are stall-spin fatalities necessary? Is even one fatality per year necessary? Is even one minor injury necessary? I say emphatically — *NO!*

Who are the people behind these statistics; who upon coming to an unexpected and untimely end, remain in the records as an entry under this category of so-called "ACCIDENTS"? Are they cowboy flyers, thrill seekers, immature show-offs and the like? Possibly, although I doubt if any deliberately committed suicide. Think back to any personal acquaintance of yours who has been trapped by this maneuver and what do you find? I can only find young men with a serious purpose in life with much to live for and a great future ahead of them, who were cut down in the flower of manhood.

Is this maneuver necessary? What are the conditions under which it was being performed when the injury occurred? First, any thinking person realizes that the stall or a similar maneuver as we know it, to release lift from the wings so the ship will become heavy enough to remain on the ground under varying conditions, is practically a necessity for safe landing technique as we know it today. Then, one half of the maneuver appears justified and is necessary in learning to fly.

What about the spin, then, that sometimes follows stall, particularly when the rudder is turned, as in the pattern for landing or practicing low altitude turns? Mind you, the statistics at hand do not reveal the percentage of injuries which occurred in the traffic pattern, nor in training maneuvers, but I will wager that the great majority occurred at altitudes insufficient for recovery, indicating that one or the other of the above conditions prevailed. Getting down to bare facts, is the spin necessary?

Again, complete research indicates that the answer is emphatically — *NO!* Some old-time flyers and even some members of government agencies concerned with flying safety defend the necessity for this maneuver on the grounds that it is necessary for the training of military pilots, and since the bulk of recent training was for that purpose and the bulk of the civilian planes up to a recent date were simply built for training, all civilian planes which were to gain approval as "conventional" would have to be capable of performing this maneuver. However, recent military needs have dictated a standard trainer for all the services which is not to be made available for civilians, therefore, the main point usually advanced for clinging to old fashioned ideals has evaporated!

You have heard all the other points, the necessity for the slide slip, imaginary cross-wind landing difficulties, and so on, which have been completely discredited in the past two years by actual use of aircraft certified as incapable of spinning, and the many popular makes which are now almost completely resistant to the spin.

I believe it is the duty of every flyer to recommend and support legislation which will outlaw construction and sale of any flying vehicle having unsafe flying characteristics, just as autos with two wheel brakes have been outlawed.

Let us all take it upon ourselves to educate the general public and all prospective plane owners, in particular, that the engineering know how, production technique and flying knowledge have advanced to the point where such fatalities *are unnecessary* and do not have to be contemplated as part of the price for participation in private flying.

Let us support these convictions with dollars and sense, driving those who do not conform to these modern conceptions to the economic abyss which has swallowed all who fail to progress. The AOPA, NAA, CAA, CAB or any other entity can not do this by edict, but the members of such organizations and all who are actively engaged in flying can press individually toward this end.

Similarly, collisions and allied accidents are due entirely to the dark ages practice of giving a pilot only a small peep hole from which, under certain favorable conditions, he may peer at a small area directly in front of him, if he can stretch far enough.

They are due to this fundamental lack of all-around visibility, both on the ground and in the air. No one has yet proved to me that individual pilots will deliberately risk their lives or their passengers' lives by taxiing or flying directly into an object they can see.

Not one manufacturer of present-day aircraft has provided a rear or side view mirror, and yet with the varying conditions prevailing throughout normal flight these vehicles cross paths constantly in ascending, descending or cruising. Of course, the solution is not as simple as that. But the principle is. Overhead and underneath visibility is just as important as good front and rear vision. It isn't the careful pilot who always clears his flight path that we are concerned about, but he can be run down or overtaken at any time by the "other fellow" who can't see him.

What is behind so called "Pilot Failure"? Is this term ambiguous? Does it mean anything at all unless we know something about the hundred and one other things that go into making up an accident? Or is it any easy way out for the investigator? Is the use of dark colors in painting aircraft a factor? Could be.

CAN COLLISIONS BE ELIMINATED ENTIRELY IN THE AIR OR ON THE GROUND? Like everyone else, I would like to think that this little problem could be wrapped up in one bundle and disposed of like the family wash. However, I feel there is about as much likelihood for success in this direction as there would be if one attempted to eliminate all automobile collisions.

Don't misunderstand me, though, as I feel that this hazard can be minimized to the vanishing point by obtaining the cooperation of all manufacturers in adopting a simple color code, if paint is applied to their product, which won't cost them a cent if they simply avoid the use of colors which have a low light reflectivity value. Repair stations, maintenance depots and individual mechanics would also have to be guided by this same code in order to make it completely effective. Here is the place where the CAB and the CAA enter the picture, in setting up such standards and seeing that they are observed. No more red tape, though, or regulations. I would rather leave the matter up to spontaneous action by the manufacturers and follow through as a matter of dealer education.

In addition to the clear vision needed in all directions, sunshades or filtered glasses are necessary when flying into the sun, morning or evening, or skirting a cloud formation with the sun just over the edge and under many other conditions too numerous to mention here. These are small items and probably should be classified as accessories.

But we need, first and foremost, insistance by all policy-making groups upon new standards of visibility and adoption of a sensible color code, plus general education of the flying public to make use of available accessories to avoid glare and temporary blindness. No hazard has ever been eliminated or minimized without attention being directed to it and concerted action being taken by all concerned.

The life you save can be your own!

SEAPLANE OWNERS

Attention all Seaplane owners and pilots—have you registered with AOPA's new Seaplane Department? If not, complete the following form so your name may be listed to receive seaplane information.

SEAPLANE REGISTRATION

NAME .....
ADDRESS .....
AOPA NO. .....
RATINGS .....
IF OWNER, TYPE PLANE .....
NC NUMBER .....

CROSS-WIND GEAR

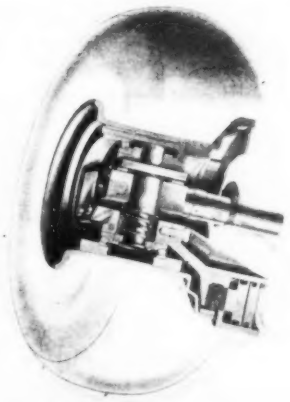
LANDING fields along highways and small bases almost anywhere you want to put them are promised to light-plane flyers as the result of cross-wind landing gear development and its application to planes now on the market.

Highlighting the spring news on the cross-wind gear is the announcement from Cessna that cross-wind gear is optional additional equipment on all upcoming models. Other manufacturers are expected to follow suit.

The growing use of the gear follows a long campaign by AOPA for its development and application to light-planes.

Typical of the new devices, which have passed strenuous tests under the supervision of the Civil Aeronautics Administration, is the Goodyear Tire and Rubber device pictured here. It will allow aircraft to yaw 25 degrees on either side of center and still maintain a straight landing or take-off roll. Thus the ship weathervanes into the wind on landing while the 25 degree wheel pivot compensation enables directional roll on runway heading.

O. W. Loudenslager, Goodyear Aircraft research engineer who headed the work on the cross-wind landing device, said that this type installation is readily adaptable to conventional tripod landing gear equipment on most light-planes. It is hoped that the unit can be mass produced cheaply enough to make change-overs economical and to facilitate plane manufacturers' including it as original equipment in newer models.



Goodyear's cross-wind gear can be installed easily on most lightplanes.

Reports are that the cross-wind gear performs perfectly under all conditions. Little training is necessary for making landings with the new type wheel. Standard procedure for into-the-wind landings on the new wheels is not changed in any respect.

Loudenslager points out that the single disc brake was necessary because it is the only type providing adequate wheel space for the kingpin and cam arrangement. He said that this device was even more rugged than the standard wheel assembly and could take commensurate punishment.

Added weight is negligible, since the entire assembly may be held in the palm of the hand.

NEW CODES

Watch for the new identification codes on radio ranges now going into effect. The following are a few of the identifiers that have been changed to three-letter code signals:

Facility	*Old*	*New*
Aberdeen, S. Dakota.	AN	ABR
Akron, Ohio	AX	AKR
Albuquerque, N. Mex.	AB	ABQ
Amarillo, Tex.	AQ	AMA
Battle Creek, Mich.	JC	BTL
Bismarck, N. Dak.	RK	BIS
Brownsville, Tex.	JI	BRO
Chanute, Kans.	CZ	CNU
Charleston, S. C.	CS	CHS
Charleston, W. Va.	KN	CHW
Cleveland, Ohio	CV	CLE
Columbia, S. C.	CI	CAE
Dallas, Tex.	DL	DAL
Des Moines, Iowa	DM	DSM
El Paso, Tex.	EO	ELP
Fort Worth, Tex.	FV	FTW
Lincoln, Nebr.	HK	LNK
Minneapolis, Minn.	MP	MPS
New Orleans, La.	NO	MSY
St. Louis, Mo.	ZJ	STJ
South Bend, Ind.	SN	SBN
Winston-Salem, N. C.	DWS	INT

PILOT PERSONALITIES IN AOPA

P J. Sones | Robert Cummings | Joan Leslie | Bob Smolinski | Walt Shaner | Clair Engle

P. J. Sones, AOPA sponsor, holds AOPA registration number 41. He started flying O. S. Waco's and Great Lake Trainers in 1928 and obtained his private ticket in 1930. In 1938, he won the Liberty Treasure Hunt between St. Louis and N.Y., placed third in the First Invitation Race from Miami to Cuba in 1936 and won the MacFadden planned flight contest in Florida in 1937. During World War II, he commanded CAP's Coastal Patrol number 13 based at Sarasota, Florida, which flew nearly 11,000 hours over water with small single-engined planes.

Robert Cummings, AOPA 20157 (pictured above with Joan Leslie) well-known stage and screen star, soloed in Joplin, Missouri, in 1927. Mr. Cummings holds all flight ratings except S.A.T.R. and has instructed since 1929. He holds the first flight instructor's rating issued when this rating was created, and was a primary and basic flight instructor for the Army during World War II. Canada awarded him an Air Safety Award for soloing 94 students—83 went overseas—11 decorated — none injured — none killed — none involved in a serious accident!

Bob Smolinski, AOPA 4758, and Walt Shaner, AOPA 4725, are shown above loading a box of bread crumbs to be dropped over snow-covered fields near Norristown, Pa., for starving birds and wild animals last winter. Smolinski is manager of the Patco Airport, and was among the first of the Pennsylvania aviation enthusiasts to employ this means of providing food for deer, wild turkeys and smaller game.

Rep. Clair Engle of California, AOPA No. 40387, known as the "flying Congressman," regularly used a private plane to cover his vast 600-mile-long second district. Since learning to fly in 1942, he has piloted virtually every type of private plane and has logged more than 500 hours. At present he is studying for an instrument rating. Last summer he flew solo to California and back in a Luscombe 85, owned by the Congressional Pilot's Association Inc., of which he is vice-president.

Legally Speaking

By ALFRED L. WOLF, Esq.
AOPA General Counsel

ONE OF the most significant legal controversies from AOPA's viewpoint has recently been concluded favorably to aviation's interest.

A man named Chamberlain sought to construct an airport on a 450 acre tract of vacant land near Akron. An assorted group of neighbors objected, *anticipating* that the operation of the field would be a nuisance. The lower court told Chamberlain to stop building the field.

Ohio's Court of Appeals reversed the lower court and allowed Chamberlain to proceed, pointing out that "to find that irreparable damage will follow from the operation of the port would be but guess and speculation."

The Court went further to state that " ... On the part of the defendants it is a question of the life or death of a legitimate and necessary business. The inconvenience to be experienced by the plaintiffs from the erection of the airport does not appear to be any greater than the inconvenience or damage resulting to the owners and occupiers of residential property in the vicinity of or adjacent to any airport erected in this state. ..."
and
"... And to find that the use as an airport of approximately 450 acres of land beyond the city limits and away from the closely-built-up and congested part of the city is an unreasonable use of the land, would, we think, under the circumstances of this case, obstruct the development of aviation, as a legitimate and necessary industry, to an unreasonable extent."

Your Association has been alert to assist airports against legal hindrance and has collected a group of decisions similar to this recent one, recognizing the importance of airports to aviation and aviation to the community.

Should you or your airport be harassed, be sure to write for help.

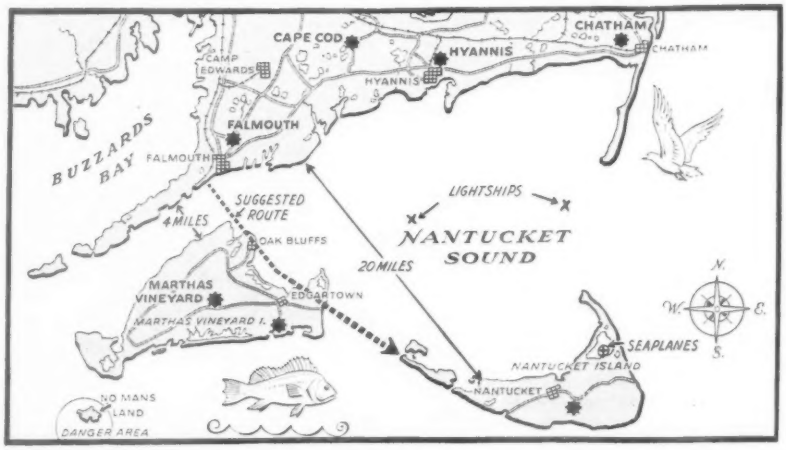
World Air Annual

WHAT is claimed to be the first authentic statistical and historical compilation of international aviation firms will be published in June by the Aviation Research Institute, Washington. The book, which will be edited by Dr. J. Parker Van Zandt, will be called the 1948 World Aviation Annual.

The Board of Trustees of the Institute includes some of the leading names in modern aviation, among them Charles H. Colvin, past president of the Institute of Aeronautical Sciences; T. P. Wright, former Administrator of Civil Aeronautics, and William P. McCracken, Jr., former first assistant secretary of commerce for air.

NANTUCKET FLIGHT

Largest turnout in AOPA history is expected for New England Unit's flight to Nantucket in June.



Flight map of New England area shows route for planes to follow in Nantucket flight.

HALF the states in the nation will be represented and the biggest turnout in AOPA history is expected at the second annual flight of the New England AOPA Unit and guests to Nantucket, scheduled for June 19-20 with a rain date the following week-end.

More than 30,000 fliers have been notified of the flight and a turnout of more than a thousand planes is expected, according to reports as this goes to press. Invitations have gone to members fron Maine to Washington, D. C., and as far west as Ohio.

Last call for reservations is still echoing from New England. Send them directly to Jean Adams Cook, airport manager at Nantucket.

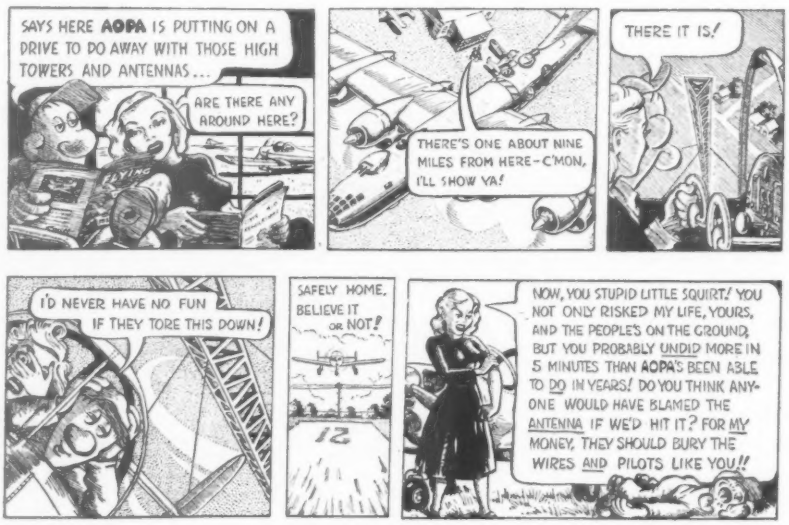
Plane owners will bring their own tie-downs. A lobster shore dinner, swimming, boating, and scores of other activities are on the program.

Coast Guard patrol will be maintained Saturday and Sunday for overwater protection and complete emergency equipment will be standing by at Nantucket.

The flight, the New England Unit expects, will far outstrip the one last year, when 270 aircraft brought 600 revelers to the island. Several pilots came from as far as a thousand miles.

NO NAME

By J. K. WELLS, AOPA 33052


SAYS HERE AOPA IS PUTTING ON A DRIVE TO DO AWAY WITH THOSE HIGH TOWERS AND ANTENNAS...
ARE THERE ANY AROUND HERE?
FLYING
THERE'S ONE ABOUT NINE MILES FROM HERE-C'MON, I'LL SHOW YA!
THERE IT IS!
I'D NEVER HAVE NO FUN IF THEY TORE THIS DOWN!
SAFELY HOME, BELIEVE IT OR NOT!
12
NOW, YOU STUPID LITTLE SQUIRT! YOU NOT ONLY RISKED MY LIFE, YOURS, AND THE PEOPLE'S ON THE GROUND, BUT YOU PROBABLY UNDID MORE IN 5 MINUTES THAN AOPA'S BEEN ABLE TO DO IN YEARS! DO YOU THINK ANYONE WOULD HAVE BLAMED THE ANTENNA IF WE'D HIT IT? FOR MY MONEY, THEY SHOULD BURY THE WIRES AND PILOTS LIKE YOU!!

ALTON G. CORNEBY, Secretary of the CAVU Unit (Endicott, N.Y.), reports that recent guest speakers were JACK HARLEY, Managing Editor of the *Empire State Pilots*, and RUDY MARTINEK, private license examiner. They also held a fun gathering recently with the members' wives as guests.

Sacramento Unit's March meeting broke local records with 125 pilots and their guests. Because of the unusually large group, unit officers sent the "Search and Rescue Unit" out for additional refreshments.

New officers elected by the group are: BUNNY CRITES, AOPA 33996, Chairman; GAYLE FISHER, Vice Chairman; HELEN NICOLOS, AOPA 13317, Secretary; and Peter Loris, AOPA 31394, Publicity Chairman.

The Seattle Sky Ranch at Issaquah was the scene of the Seattle Unit's March meeting. Speaker was BLANCHE NOYES, AOPA 41619, and well-known instigator of the U.S. Skyways, who told how she was persuaded by Unit members ELLIOTT MERRILL (experimental test pilot at Boeing's) and JOE ADAMS, State Aeronautical Director, to chart Skyway Number 2 from Seattle to Boston.

The Philadelphia-Camden Unit held its second Flyers Fling on March 31st, at Weber's Hofbrau, Central Airport, Camden, New Jersey. Three hundred and twenty diners, including members of the local unit, Underhill-Central Jersey Unit, Trenton Unit, and their friends, enjoyed a dinner, dance and show, made doubly interesting by the drawing of several door prizes, climax of which was the grand drawing for the raffle of a Crosley radio-phonograph combination.

Guests of the Philadelphia-Camden Area Unit who participated were HENRY P. ADAMS of the Weather Bureau, and KEN RONEY of the C. A. A., as well as operators of many airports and aviation schools in the area.

As an anticlimax to the Fling, 60 members and friends flew into Philadelphia's Northeast Airport in 25 airplanes on Sunday morning, April 4th, and had breakfast.

The above unit, in cooperation with many adjacent units, plans to have activities throughout the year, to create more interest in private flying.

WARREN E. CAREY, Director of the new California State Aeronautic Commission, was guest speaker at a recent San Francisco Peninsula Unit meeting. That Unit also presented AOPA's certificate of Merit to the San Francisco airport and assigned members to report on local and nearby airports.

Meteorological Services

THE WEATHER forecasting and reporting services for civil aviation are provided by the United States Weather Bureau of the Department of Commerce. Observations and reports are made at hourly intervals at approximately 500 stations. Special reports are made for sudden deteriorations and improvements in weather conditions.

The stations from which forecasts and reports may be obtained fall in three categories:

(1) *Airway Forecast Centers*: 18 offices located in principal cities where forecasters are on duty 24 hours every day to provide forecasts, information, and advice concerning aviation weather.

(2) *Flight Advisory Weather Service Units*: Located in the 26 Airway Traffic Control Centers and staffed 24 hours a day to give short-range detailed weather information and advice.

(3) *Weather Bureau Airport Stations and Airway Communication Stations*: Most of these stations are open 24 hours a day and weather reports, regional forecasts, and terminal forecasts as distributed by teletype may be obtained from them. In many cases, however, professional forecasters are not on duty throughout the 24 hours at these stations and requests for specific trip forecasts may be made sufficiently in advance to permit obtaining the information from the appropriate forecast center.

If forecasts are obtained by long-distance telephone, it is recommended that the call be directed to the nearest Forecast Center or FAWS unit. Requests for trip forecasts should include details of the route to be followed, time of departure, estimated time of arrival, air speed and type of aircraft, flight altitude and whether flight will be made VFR or IFR.

As much prior notice as possible should be given in requests for trip forecasts. Where full meteorological service is required, at least two hours' notice (in addition to communication time) should be given for a flight exceeding 500 miles from point of departure to point of first landing, and at least one hour's notice for flights not exceeding 500 miles. When notifications requested above cannot be given, every endeavor will be made to provide the best service possible in the time available, but it is possible that the service will not be as complete as desired.

The attention of pilots is also directed to the fact that weather reports and other information are broadcast twice hourly from all continuously operated CAA radio range stations and several times daily from a number of commercial radio broadcast stations. Details concerning the CAA broadcasts may be found in the CAA *Flight Information Manual* and a listing of the commercial weather broadcasts may be obtained by writing to the Chief, U. S. Weather Bureau, Washington, D.C.

SCOREBOARD

Staff members represented AOPA pilots at the following aviation conferences last month:

ICAO—Rule of the Air Committee
RTCA—Executive Committee
FCC—Conference on VHF facilities for itinerant pilots
Weather Bureau — Conference on scheduled weather broadcasts
CAB—Part 60, Air Traffic Rules, conference

Philadelphia-Camden Unit members entertain friends at dinner, dance and show. Officers and committee members are seated at the main table in background.

VOX PILOT

Greetings to Member Baker

Seldom has a Vox Pilot letter received such an enthusiastic response as the one appearing here in the April issue from Leonard E. B. Baker of Kent, England, who wanted to join AOPA but could not because currency restrictions prevented his sending money to this country.

Almost before the issue appeared in print, letters began to pour in, the first from Gordon Lefebvre, AOPA 19400, of the Cooper-Bessemer Corporation, Mount Vernon, Ohio.

"It gives me a great deal of pleasure," wrote Mr. Lefebvre, "to enclose my check to cover Mr. Baker's membership and subscription to FLYING Magazine. I would appreciate it very much if you would send him the necessary application blank and enroll him for membership.

"I would prefer that Mr. Baker not reimburse me for this membership," he added, "but simply consider it as a small token of one American's high regard for our British cousins who did such a magnificent job during the recent war."

Hardly had the Lefebvre letter been received and Mr. Baker's membership duly added to AOPA rolls than a flock of others expressing parallel sentiments and inclosing checks arrived at AOPA headquarters.

Among those who volunteered to pay Mr. Baker's membership were Dr. John R. Montgomery, AOPA 31636, of Delano, California; L. E. Lowrey, AOPA 16283, of Hibbing Minnesota; Richard D. Stimson, AOPA 21802, of Washington, D.C.; G. M. Countryman, AOPA 36422, Fergus Falls, Minnesota; Dr. N. P. Dunne, AOPA 19143, Oakland, California; LaRue D. Trembley, AOPA 40370, Colfax, Illinois; Bernard Thyson, AOPA 9418, Pensacola, Florida; David Davis, AOPO 5765, Bloomington, Illinois, and Lawrence K. Chrisman, AOPA 38745, Pennsville, N. J.

Dissent on Buzzing

GEORGE V. STEDMAN, Chief of Enforcement and Accident Investigation for the Pennsylvania Aeronautics Commission: I am inclosing a quote from Russell Gard's column in the *Philadelphia Aviation Times*. I thought that his comments on buzzing may interest you since they seem opposed to views which have been expressed in your columns. Says Mr. Gard:

"Buzzing is one sign presaging more healthful expansion of aviation. I saw a few jobs of buzzing in recent travels, and they were really good. I don't sanction buzzing where lives are endangered or where it's a nuisance, but I do think it reflects real enthusiasm for flying. It may not be the sanest way to reveal it, but there certainly is no doubt that the pilot finds aviation with something to offer. Buzzing, I believe, proves the existance of enthusiastic interest in aeronautics—a type of interest necessary if aviation is to go forward."

(How about it, Members? And look, Russ, when can you buzz without at least endangering one life—that of the buzzer?—**Ed.**)

High Tax Bill

L. D. WILKINSON, AOPA 8815: My wife and I have put 200 hours on our 1946 Cessna, and have enjoyed every minute of it, but the enjoyment was lessened recently when I received my tax bill in the amount of $122. This is for the city and county of Denver, Colo. If someone does not do something to relieve Denver aircraft owners, flying will be greatly curtailed. I, for one, will have to sell my aircraft—and I assure you I won't be the only owner in Denver to do so.

Shoulder Harness

HARRY L. DOUGLAS, AOPA 40920: You might be interested in learning that the Irving Air Chute Co., Glendale, Calif. has a good shoulder harness that sells for $18. Ones with their instant snap sell for $30.

Wants to Join AOPA

WERNER KUNTZ: I read about your Association today in FLYING. I am a young German and a pilot. From the age of 15 I flew—first a sailplane and then airplanes, and have had a license seven years. During the War I flew an intercepter fighter.

We are not now allowed to fly here, but we like to talk of our experiences before the war when all flyers in the world spoke a common language.

Can I possibly be a member of AOPA, and how can I pay my membership dues? And, can you find some members who would like to write and exchange experiences with a German pilot and his friends.

Be not anxious, we are not Nazis. We are all young Germans, who are glad the terrible 12 years of slavery are over. We now can speak openly and frankly with all men and flyers in the world without being afraid of the Gestapo. My address is Wetzlar Lahn, Kirchstrabe 24, Hesse, U.S. Zone, Germany.

In Memoriam

We have been advised of the deaths of the folowing AOPA pilots. To their families and friends we extend our deepest sympathy.

A. KARL FISCHER, 5952
F. H. FRIDENSTINE, 4711
KEITH D. MCCRARY, 32560
CHARLES D. NELSON, JR., 32426
JONAS G. RUFF, 1109
LEONARD L. WILSON, 10484

Unclassified

CHOCKS AND INTERPHONES—Aluminum alloy and rust-proof steel chocks weighing 28 ounces. Regular price $9.50, $8.10 to AOPA members. Interphone has two tubes for high volume, and plug connection for output of radio receiver. Regular price $19.50, AOPA price $16.50. New design tie-down kit, indestructable and more effective. Regular price $3.95. $3.40 AOPA price. Address A. C. Ridland, Engineering Enterprise, 525 South Ardmore Ave., Los Angeles, Calif

DISCOUNT—Latest 1948 issue of National Aircraft Blue Book is available to AOPA pilots at $2.00 per copy (regular price, $3.00). Checks or money orders payable to National Market Reports; orders placed through AOPA.

LOGDOMETERS — Aero Instrument Corp. has extended AOPA discount on Logdometers. Members may purchase one for $26.78—regular price $29.75. Keeps accurate record of aircraft and engine flying time. Delivered complete with fittings, it weighs less than a pound. Send check or money order payable to Aero Instrument Corporation to AOPA.

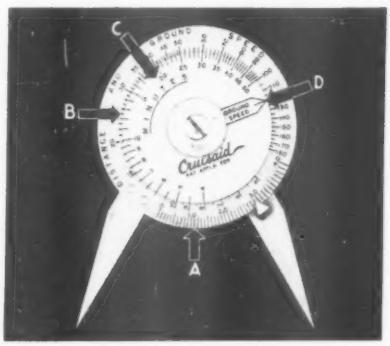
ATTENTION LIGHT PLANE OWNERS—Why throw your old tires away when they can be retreaded for less than ½ the cost of new ones? Our special retreads of Grade "A" Natural Rubber are guaranteed to give you service equal to or better than new tires. Sizes 800x4 and 600x6 only. 10 percent discount to AOPA members. Fast service. KEECON COMPANY INC. Box 5, Funkstown, Maryland.

DESIGN—A folder describes the service provided by this company in the way of Industrial Design. The company was established to aid the smaller manufacturer who does not have a full-time development man or staff, by Lee Bernhardt, AOPA member. The folder includes a schedule of rates. 10 percent discount to AOPA members. Write Mr. Bernhardt at Design, 2707-09 South Calhoun Street, Fort Wayne, Indiana.

INSTRUMENTS—Kliger Aircraft Instrument Service company, Hybla Valley Airport, Alexandria, Va. offers 10-20 per cent AOPA discounts on all aircraft instruments—post-war and surplus.

DISCOUNT—Robert A. Geier, AOPA 42553 offers a 20 per cent discount to AOPA members on his new book "Fly Right." Regular price $1.50. Address Geier at P.O. Box 986, Santa Ana, California.

AIRPORT DISCOUNT—5 per cent discount on gas, oil repairs to AOPA pilots. A. W. Campbell, Municipal Airport, Plattsburg, New York.



COMPUTER—The Cruisaid (pictured above), simple navigation instrument that can be operated with one hand and is made of satin finish stainless steel with deep etched black enamel filled figures, may be purchased by AOPA members for $5 (reg. price $6). Combination of a pair of dividers, protractor, and simple ground speed computer, it answers practically all of the problems of contact flying. The $5 price includes pocket-size leather carrying case. Write Harold Dyer, AOPA 30110, Eaton Manufacturing Co., Battle Creek, Mich.

Guarantees and/or descriptions of above items and services are those of the individual business concerns.

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I. BUNSTER: Santiago, Chile (Bunster & Bezanilla, Ltd.)

". . . Greatest instrument ever made to insure the lives of aircraft owners. I will never fly another plane without the Lear Orienter . . ."
FRED R. GEARHART: New York City (Gearhart and Company)

"Your Lear Orienter is a wonderful piece of radio navigational equipment. It is the best I have ever seen . . ."
PAUL BUTLER: Hinsdale, Ill. (Pres., Butler Paper Co.)

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Lear FIELD SERVICE

THE NAME MEN FLY BY

If War Came Next Week

(Continued from page 14)

widely dispersed throughout the world.

If war came next week, bombers would be in the air before breakfast, flying from bases scattered across the nation. By training and experience U. S. crews are qualified to attack across the Atlantic, the Pacific or the Arctic. Their targets are already selected.

The first U. S. attacks would be heavy. But the offensive could not long hold its initial pace. The supply of stored planes would be exhausted very soon.

America's preparedness looks best when compared with December, 1941. It is not a bright picture when held beside the "irreducible minimums" outlined by two great inquiring bodies—the President's Air Policy Commission and the Congressional Aviation Policy board. But it is not discouraging. Overall, the main requirement seems to be for time—time to rebuild the demobilized forces along lines drawn from war experience and post-war study. The Air Force and the Naval air arm are flying a good heading.

Today the Air Force can put into the air on long range missions more than 300 *Superfortresses*. It needs but a few hours' notice.

The B-29s look like those that smashed Japan. But they can fly a bit faster and at least 1,000 miles farther. But they still must fly without escorting fighters. Our one long-range fighter, *Twin Mustang* (F-82), is not yet with the Air Force in quantity.

The Navy has a dozen large carriers and 13 fighter and bomber groups ready to go. They, too, represent better than war-time equipment. And they have been in the Mediterranean, the North Atlantic and the North Sea. Some of the carriers now are steaming in those waters.

The Air Force has been using a single bomber type for strategic warfare—the B-29. The B-50 has just reached the first group stage, and the B-36 is close. But it will be some time before either could be sent to battle.

It is using Lockheed *Shooting Stars* (F-80) as its main jet fighter because that is all it has in quantity. There still is a large number of *Mustangs* (F-51) and a smaller number of *Thunderbolts* (F-47). Relatively few of the 600 Republic *Thunderjets* (F-84) on order have been delivered, though they are coming along. The North American F-86, fastest of the jet fighters disclosed thus far, is due to reach the Air Force this year, along with the B-45. But they will be in small numbers.

Incidentally, start now to get accustomed to seeing "F" rather than "P" as a fighter designation. The Air Force soon will officially revise its aircraft type identification and Washington headquarters has adopted the "F" already.

The Navy is stocked largely with surplus planes but it has at least 1,000 strictly post-war craft, including two jet fighters, in operational service.

The list includes Grumman *Bearcats* (F8F), Chance Vought *Corsairs* (F4U-5), Douglas *Skyraiders* (AD-1), Martin *Maulers* (AM-1), Lockheed *Neptunes* (P2V), Martin *Mariners* (PBM-5), McDonnell *Phantoms* (FH) and North American *Furies* (FJ). None of those saw action in World War II although the *Corsair* and the *Mariner* versions are modifications representing broad improvements from World War II fighters.

The Navy has 14,000 planes, of which 5,800 are operating, 2,000 are in reserve, 2,300 are in storage and nearly 3,000 are being overhauled, held in pools or in transit.

It has two full jet squadrons, one on each coast, and a Marine squadron composed of combination jet and propeller fighters based at Cherry Point, N. C., and headed by Maj. Marion Carl, holder of the World speed record.

If war came at any early time the fighting would be done by conventionally powered planes. Jet planes and engines are coming off the line too slow for war's needs, and tactics and shipboard handling problems have not yet been fully developed.

The Air Force today has 55 combat groups and 17 separate squadrons. Thirty-two groups and eight separate squadrons are based in the continental United States. Twenty-three groups and nine separate squadrons are in Alaska, the Caribbean, Pacific, Far East and Europe.

Overall, the Air Force has around 23,000 planes, including trainers. Eleven thousand are on the active list, 12,000 are in storage. The storage total is decreasing rapidly as the planes are pulled out for modification to give them the most modern available equipment.

The Air Force today has 5,000 active combat planes, against 80,000 at its war-time peak, and only 130 bases, compared with 1,700 it once had sprinkled over the globe. It has 370,000 officers and men compared with its wartime peak of 2,411,000.

The brightest spot in the readiness-to-fight picture is Gen. George C. Kenney's Strategic Air Command, the nation's long range striking force. It includes the 8th and 15th Air Forces.

There is only one trouble: it is a "one-shot" powerhouse. Nevertheless, the SAC's 11 bomber squadrons are justly proud of their readiness—if not their size. They are trained to a wartime perfection. Every crew is getting acquainted with the world through regular flights to Europe, Japan, the Arctic and the Caribbean.

Their training requires that the crews be able to manage for themselves away from home for 30 days. They must learn to operate on simulated bombing missions from overseas bases.

Every B-29 squadron remains constantly in readiness for occasional maximum effort orders. That means that within hours of receiving instructions, a group or an entire air force must be able to strike a designated target—not once, but usually three times in quick succession. Normally these operational readiness tests call for three full missions in five days.

Crews are being trained to handle all related jobs. This anticipates the approaching day of the jet bomber, with only two or three crewmen. It would be useful also in emergencies.

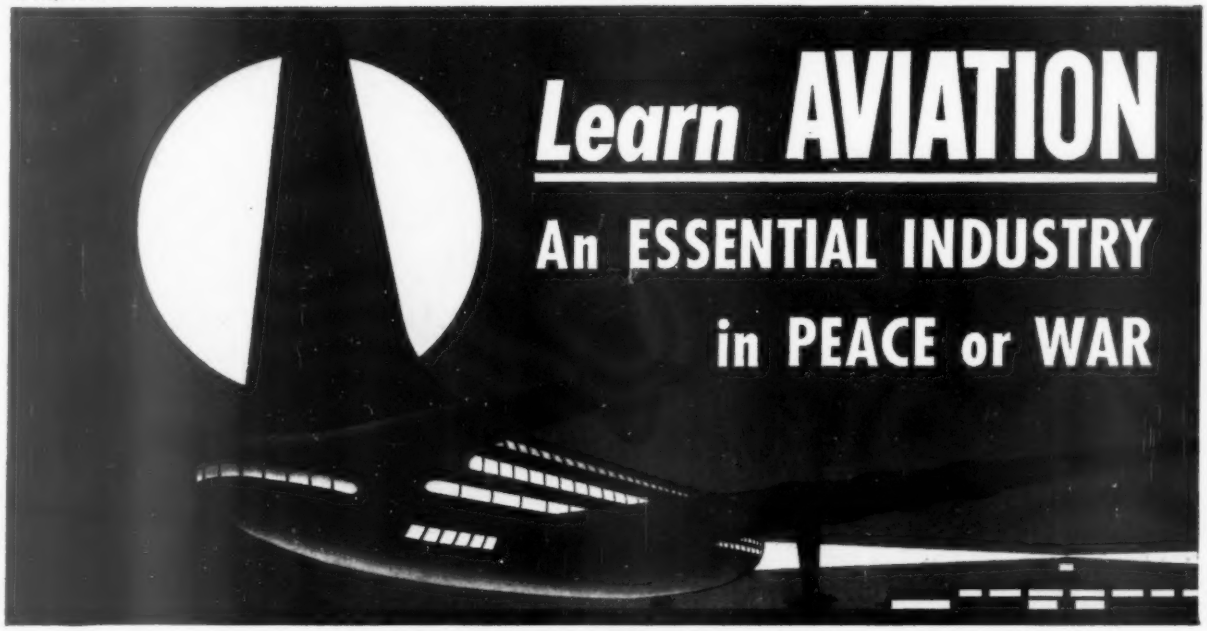
Every month each pilot must make at least one 4,000-mile flight with a normal gas load and a simulated five-ton bomb load, and land with an adequate safety margin of fuel. Every three months he must make a 4,500-mile mission. Every pilot must keep sharp on bad weather and night flying and instrument approaches.

The present usable range of the B-29 appears to be something over 4,000 miles.

FRONT LAWN TIE-DOWN

IN air-minded Wichita, Kans., where most everyone flies, thinks about flying, or works in an aircraft factory, Perry A. Rathbun stores his twin-engined Cessna on his front lawn. Rathbun, an aircraft mechanic with Rowdon Brothers Flying Service, bought the plane from War Surplus for $1,000.

He flew it up from Texas, landed at a Wichita airp[illegible]ile from his home, then taxied it through the streets until stopped by telephone poles. He had it towed on its last lap. "Now I'm fixing it in my spare time," he explains, "and there's no better place than right at home." All this seems to be the normal thing in Wichita.



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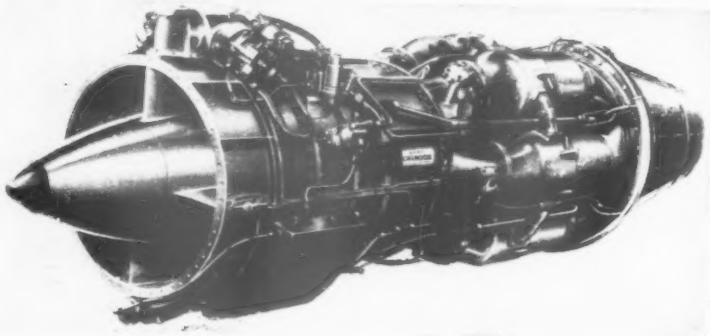

CANADIAN JET

CANADA'S first jet engine is the Avro-built *Chinook* which recently completed its first test run. The *Chinook* has a nine-stage axial flow compressor, six combustion chambers and a single-stage turbine. The engine is 32 inches in diameter, 125 inches long, and weighs 1,250 pounds. It will deliver the equivalent of 2,500 horsepower.

But that can be extended by as much as 1,500 to 2,000 miles by refueling in flight, once a stunt practiced by endurance flyers but now the subject of serious study for both military and commercial flying.

One of the important jobs to be done on B-29s which are to be modified in the No. 2 Boeing plant at Wichita, Kans., is fitting them for refueling aloft. Details of the American system have not been released, but it is similar to that which the British have used in more than two dozen transatlantic crossings with *Liberators*. Our system includes a much higher rate of fuel delivery from the tanker to the receiving plane.

Tests were begun at Eglin field in 1944, using a *Liberator* (B-24) and a *Flying Fortress* (B-17). It was generally determined that range could be increased by 40 per cent if refueling were done on the outbound trip and up to 75 per cent if the bomber were refueled both outbound and homeward bound.

Air Force officials look upon refueling as means of reducing the overseas requirements in men, fuel, materials and equipment, and lessening the need for forward bases in the early stages of war. They are convinced it can be done over the Arctic in areas where enemy planes could not interfere.

There is every reason to look for ways of stretching the B-29's reach. It may be necessary to match the range of copies made by the Russians and probably reproduced by the hundreds (see "Russia Steals the Superfort," page 28). The Soviet Air Force is believed to have omitted much of the weighty protection used in the American version and thus to have provided considerable additional fuel capacity. It may have added as much as 1,000 miles to the Red bomber copy.

Russia is believed to have around 30,000 military planes, about half active and half in storage. The total may include 2,000 jet fighters and several hundred of the B-29 copies. These copies probably are unpressurized and have ordinary fuel tanks and manually-operated guns.

While our own B-29 crews are being checked on their radar bombing, running regular weather flights over the north pole, and learning to live on emergency rations in Alaskan wastes, the men of the Tactical Air Command have been at home brushing up on support of the Army Field Force.

TAC's headquarters are at Langley Airbase, Va., next door to the Field Force headquarters at Fort Monroe. Like the Strategic Air Command, TAC has two air forces within it, the 9th and the 12th.

It is using *Mustangs* (F-51), *Shooting Stars* (F-80), *Invaders* (A-26), *Thunderjets* (F-84) and *Packets* (C-82), the latter for troop and cargo carrying.

Communications are a large factor in tactical air operations and TAC is dishing out a full course in telephone, radio and radar work.

Everything about the training is intended to simulate wartime conditions and maintain a state of readiness equal to that of SAC. Developments in warfare being what they are, it is difficult to see the precise situations TAC might encounter. For that reason it must be prepared for a wide variety of activities.

If enemy bombers really did hit Pittsburgh next week, the biggest problem in maintaining a full-out counter-offensive over an extended period would be supplying the aircraft and equipment.

The Air Force and the Naval and Marine air arms are ready today because of tremendous surpluses of World War II aircraft which have made it possible to keep training up to date and to maintain a fairly modern air fleet by modifying the aircraft. But the well is fast running dry. The only way we can maintain our readiness is to start immediately procurement programs aimed at raising production from its present 22,000,000 pounds a year rate to 30,000,000 to 35,000,000 pounds a year. If we don't, our make believe "war next week" could turn into a real life disaster sooner than we care to imagine. END

X Marks the Spot

(Continued from page 38)

tern, airspeed, bounce or coordination, but it may be categorically stated here and now that practically all CAA Inspectors and Flight Examiners will insist upon accurate pattern, controlled airspeed, safe landings and smooth coordination.

Most pilots agree that the spot landing depends upon two factors; and that of these two, airspeed is about 75 per cent of the problem while pattern is one-fourth of it.

That means that the pilot must begin his precision landing shot from a definite place in the air from which he is absolutely certain of reaching the "circle" or 300-foot markers on the runway (200 feet for commercial or flight-instructor ratings). This position is given the S64 term of "key position."

Closing the throttle (after applying carburetor heat, if the engine manufacturer so recommends), the first thing to do is to establish a glide. *This glide must be determined by an experienced pilot for the airplane being used.* Like "key position," the name for this glide has been so over-worked that it is now meaningless: the normal glide.

When asked what "normal glide" means, almost all pilots answer, "The glide that takes the airplane the farthest distance from a given altitude in still air." It tumbles out as glibly as answers from an applicant taking a CAA examination. The applicant then goes on to say that, from a normal glide, he will put his nose down to gain speed in the event he is undershooting, in order to glide a little bit further! To glide farther from a glide that takes one the farthest, is something like magic and twice as interesting.

Pilots who actually shoot spot landings and land their planes where they want to, don't use the normal glide as defined above, or the glide used for landings without a tendency to float. Their glide is one that gives the airplane a constant, maximum, safe, vertical rate of descent. It might be called an "average glide," and you can see it at "turkey shoots" conducted in airplanes with dead engines. The winners land within a few feet of each other and only a matter of inches from the marker!

The *average glide* is a glide half-way between the minimum and maximum glide. Suppose you are gliding in for a landing in a new, strange plane, which stalls at 50 m.p.h. What is the least glide you should use? The average glide? The fastest glide? The answers can be found by using a convenient thumb rule, as follows:

Least glide (minimum) = Stalling speed x plus 20 per cent ie., 50 plus 10—or 60 m.p.h.

Average glide = Stalling speed plus 40 per cent ie., 50 plus 20—or 70 m.p.h.

Fastest glide (maximum) = Stalling speed plus 60 per cent ie., 50 plus 30—or 80 m.p.h.

The average glide, as defined above, yields a constant, maximum, safe, vertical rate of descent in almost any airplane. There are exceptions, of course, as there are for any thumb rule, and for that reason the average glide should be found by an

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experienced pilot for the airplane being used. Once this is done, it can be used for the spot landing with great success and safety.

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That of course is an extreme view. Actually, our objective is not the 200-foot mark but to fly the airplane, to know how it flies, and to understand the principles of flying. The 200-foot mark is merely to demonstrate for the examiner that the applicant does understand the principles of flying and, most of all, the glide.

One school of pilots feels that this can be taught just as well by other maneuvers. This may be true, but proof of the pilot's skill and understanding cannot be demonstrated as well. The same school feels that emergency (or "precautionary" or "forced" landings—use the term you like best) can be eliminated for the same reason. The fact remains that if we go on eliminating all the "useless" maneuvers from the flying test or from flight training we will soon find ourselves with nothing but cross-country training Ask yourself this question: "Would I send a member of my family aloft with a pilot so trained?"

The spot landing actually teaches the student something about glides and when and where he can land an airplane. If he selects the maximum glide he will have both a floating glide and a glide that will carry him a great distance, possibly the greatest distance he can glide from a given altitude in still air. (It must be noted that the exact figure for any glide depends upon the airplane, and the maximum glide may vary from the 60 per cent figure by a few miles per hour.) In using the maximum glide the pilot is confused by this floating characteristic to the extent that he never knows where he will land, because the airplane responds disadvantageously to updrafts, and because it gains altitude rapidly when the nose is raised.

If he selects the minimum glide he is at the limits of safe control. True, he has a maximum rate of descent, but at great hazard. Any relaxation of elevator pressure is followed by a disadvantageous loss of altitude. If he is already overshooting with the airspeed at a minimum there is no remedy but to slip.

If he selects the average glide he has a safe, rapid rate of descent, and the projection of the glide path shows him exactly where he will land without much float. A slight dropping of the nose will gain speed and distance, a slight raising of the nose will lose speed and distance. *The amount of variation should be about 10 per cent,* or in the above airplane, from 70 down to 63, or from 70 to 77. In a lightplane stalling at 40 m.p.h. the range would be 51-56 and 56-61 m.p.h.

Now for the 25 per cent portion of the technique, the pattern. There are circular patterns, triangular patterns, and others, but in each or any of them the main concern is the crosswind or *base* leg. This leg is more important than any of the others, because it is really nothing but a succession of key positions, from any one of which the pilot must start a turn that will take him to his mark. What is more, an accurate base leg not only tells him what the wind is doing, how strong it is, and what the crab is to conteract the drift, but it prevents the possibility of being "sucked out of position" and drifted to a distance from which he cannot even make the field.

Some mention should be made of the downwind leg. After closing the throttle, the pilot flies downwind until he decides to turn 90° or more to make good his crab on the base leg, 90° to the runway. Obviously, the legs should be fairly equal, but it is just as obvious that this depends upon the altitude chosen, the horizontal distance from the spot, and the traffic rules. All in all, a clever pilot should be able to shoot a spot regardless of the altitude or downwind leg. It is the base leg that counts.

With base leg and airspeed chosen, the pilot may demonstrate his knowledge of pattern, ability to estimate altitude, gliding distance, "playing the turn," and "playing the glide." The turn from base leg should be made with the intention of turning toward the spot as soon as the pilot realizes the plane is going to land short of the spot. If the plane is obviously going to land beyond the spot, the turn should be made gradually or even prolonged until the last possible moment, ie., directly downwind from the spot. This is called "playing the turn." At the same time the pilot is getting more and more sure of where he is going to land, and during the last 500 yards of his approach, say from 150 feet altitude, he may play the glide as explained above.

Once within a few feet from the ground the jig is up: the pilot must forget about his spot, and land the airplane well, smoothly, and in normal landing position. A hard, hazardous landing within the spot is more disqualifying than a normal, easy touchdown 10 feet outside—especially for a flight instructor applicant. Yet almost every applicant will sacrifice a shock absorber for 10 feet of runway.

Should we use the above method instead of power approaches and slips? *Yes,* because the pilot can learn more about his plane during spot-landing practice. Even with power on, a pilot can select a minimum glide. Slips are fine, too, and should be used on any emergency landing, but first one must get into position over the obstacles, and then slip. It's hard to get above the trees if one doesn't know glides, or to stay a certain distance downwind and not get drifted out of position.

Can we get away from the dangerous aspects of spots? Yes—if we insist that a bad landing is disqualifying even if it is made in the center of the markers. Yes—if we teach the average glide and disqualify for minimum glides. Yes—if we teach that headwork is paramount to accuracy—such as using the throttle to get over those trees before the instructor gets that peculiar creeping sensation up and down his spinal column!

Is there any carry-over from spots to general flying? Is there any real value in spots? As far as the spot landing itself is concerned, it's useless. Almost all approaches in higher power are made with power on, but knowledge of the glide, of what the airplane will do, the ability to estimate distance, wind drift, crab, and the feel of the airplane required to hold a glide accurately (not to mention the sharpening of all the other senses) are enough by themselves to warrant practice of spots, even if the applicant never hits one. END

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Tamed Cub

(Continued from page 18)

NACA came reasonably close to the Utopian lightplane. While the experimental *Cub* could be stalled from straight and level flight—though with unusual gentleness and controllability—it could not be stalled in a turn, would not spin with power on or off and, when stalling, had no tendency to fall off. Here's the way it was done:

The docile *Cub* had the following distinctive points—The wing was mounted at minus 1.2° incidence instead of plus 1.8° on the original; its tips were washed out 5° instead of 3° (meaning that the leading edges were "twisted" down that amount at the tips). Stabilizer area was almost doubled by adding 11.25 square feet to the original 14.65 square feet. Fin area was increased approximately 75 per cent to 7.6 square feet, giving both surfaces a higher aspect ratio. Elevator travel upward was decreased from a maximum of 36° to 30.5°; and from a downward maximum of 28° to 10.5°. Rudder travel was cut down from 33° (either way) to 15°. The engine was mounted with seven degrees down thrust.

When NACA experimenters first tackled the stall problem they reasoned that up-elevator travel could be restricted to less than that required to stall the airplane—and that approximately the same elevator angle could be used for both power on and power off stalls. As any lightplane pilot has observed, it takes considerably more back stick, accompanied by faster movement of the stick as the stall is approached, to stall the machine when power is off. This, it is said, is a desirable control characteristic, in that a relatively large and easily recognizable movement of the stick is in itself a form of stall warning.

But this characteristic is not so true of the power-on stall. Such a stall, as we know, is approached gradually at cruising r.p.m. with a steady but slow increase of back stick. This less conspicuous movement of the stick, coupled with the fact that much less back stick is required for stalling, is probably a factor in stall-spins at low altitude with cruising power. So decreasing the difference between the amounts of up-elevator required for the power-on and power-off stalls is important.

This reasoning explains the seven degrees down thrust on the NACA guinea pig. Whereas an unmodified *Cub* has a difference of 12° in required up-elevator for power-on and power-off stalls, NACA's doctored version reduces this to 3°. In other words, more back stick is required to power stall the NACA *Cub*. Down thrust, negative incidence, and the effect (through down thrust) of moving the elevators out of the propeller slip stream, all increased the amount of stick travel needed to stall the airplane under power.

The "twisted" look of the wing tips is hard to detect. This wash-out eliminates wing-tip stalling and consequent falling off in the stall, where recovery by the ailerons usually is not possible. In most conventional lightplanes it is usually necessary to "walk" the rudder to pick up a dropped wing, for the rudder is the last remaining effective control in the stall. In a stalled turn the upper, or outside, wing may drop suddenly as the machine rolls, or even whips, over into a spin. Or, as so frequently happens, a sudden aileron movement to bring up the low wing in a shallow crossed-control turn close to the ground may stall the low wing and trigger the spin out the bottom. More or less violent movements of the plane, due to falling off tendencies at the stall, are eliminated with washed-out wings.

Though the *Cub* had to be left stallable in order to land, it only dropped its nose gently in such a stall and would remain in the turn without stalling, even with the stick all the way back.

The additional area of both stabilizer and vertical tail was found to improve both longitudinal and directional stability. The increased aspect ratio of these surfaces improved their effectiveness.

During spin tests on their *Cub*, NACA found that if restricted rudder control were not used, the plane could be held in a spin to the left. But when the spin had fully developed, moving the rudder back to the 15° position would permit the ship to recover after two or three turns. This was true both power on and off. When rudder travel was limited to 15°, it was impossible to spin even intentionally with *any* setting of the controls.

Even without restricted rudder controls the modified *Cub* is difficult to spin. The test pilot was forced to pull up under power, bring the stick back suddenly, kick full rudder, and cross the controls. With limited rudder movement it not only was impossible to enter the spin but, had some circumstance placed the ship in a spin, it would also have been impossible to have held the ship in the spin. The original *Cub* could be spun easily from the stall, power on or off, simply by using full rudder and crossing the controls.

Many old timers have objected strenuously to restricted controls. Many pilots who went through the mill on spinnable aircraft to get their tickets look down their noses at the two-control airplane. Is it possible that this school would look askance at the "domesticated" *Cub*? How about that limited rudder travel? What about taxiing? Do you have control on the take-off? Can you slip?

NACA admits frankly that the ship could not be taxied satisfactorily without the use of brakes. Presumably it could be taxied with rudder alone where slow, sharp turns were not required. In restricting the rudder travel, the steerable tail wheel had automatically been limited to the same degree of movement. This, obviously, could be improved. There was no loss of directional control on take-off. It was possible to slip, although the angle of bank in the slip was only 20°, or half that of the standard *Cub*. But rudder power always was sufficient to overcome aileron yaw.

Anyone who has slipped a Stinson 105, in the approach, for example, knows that when the plane is banked too steeply the rudder may not be capable of holding the nose on the runway, but that unbanking

1912 BIPLANE STILL FLYS

WHEN Billy Parker built his pusher biplane in 1912, he built it to last—as proven by flights he still makes in the aeronautical antique.

Powered with a 50-h.p. Gnome rotary engine, the 900-pound plane climbs at 800 f.p.m. Parker doesn't know the exact stalling speed, since the pusher has no instruments, but estimates it at about 45 m.p.h. Cruising and maximum speeds are the same: 70 m.p.h.

Parker, who holds pilot's license No. 44, now has over 16,000 hours in everything from his pusher to modern four-engined aircraft. He flys the 1912 model occasionally for exhibition purposes.

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the airplane slightly permits the desired straight-in flight path. In all probability the NACA *Cub* would have somewhat the same characteristic.

NACA does not bill the modified *Cub* as a panacea. It modestly labels the study, "A Flight Investigation To Increase the Safety of a Light Airplane." If the committee had not set the task of increasing safety without radically altering the airplane, it apparently could have produced a fully stall-proof model. But at least NACA has pointed the way toward reducing stall-spin accidents which, percentage-wise, force personal flying to compare unfavorably with the carnage on the highways. Elimination of the stall in a turn with a three-control airplane, where crossed controls can be held, is a major development. NACA cites CAA figures to show that half of low-altitude accidents occur from tight, steeply banked turns.

About this time the skeptic pilot will say, "Okay, so it's wonderful, but what's the catch? What price did the engineers pay to achieve this marvel?"

"On the general question of performance," stated an NACA spokesman, "you can rely on the report as being conservative. I wish we had comparative performance figures but the very fact that they (the engineers) did not feel it necessary to make the comparison indicates that they mean what they say in stating the losses are small . . . added safety is bought at a nominal loss in top speed. Stalling speed is unaffected. As the report states, a little consideration of these factors in the design stage minimizes the price of safety."

One change that did result from the added weight of the larger tail surfaces, was a rearward shift of the c.g. range from 24-30 per cent of the aerodynamic chord to 30-37 per cent. This paid off, however, for the larger horizontal tail greatly increased static longitudinal stability, and the rearward location of the c.g. facilitated landing. A direct comparison of the two airplanes shows that with the c.g. located at about 30 per cent of the chord, instability in the standard *Cub* occurred beyond up-elevator angles of about four degrees, power on, and about 17°, power off; but the modified version was stable with power on or off, except when the elevators were moved beyond 25° up. Instability was mainly lateral on the original airplane, and longitudinal on the modified *Cub*.

For example, if the power stall was accomplished on the NACA job, and the pilot continued to hold full back stick, power on, for at least 20 seconds, the airplane would increase its oscillations until, on the fourth oscillation, it could hang steeply enough to whipstall. It is almost inconceivable, however, that anyone would continue to hold back stick through so many oscillations. NACA regards this characteristic as unimportant and far outweighed by the important gains in lateral stability and controllability at the stall.

NACA currently is testing the spinning characteristics of representative personal aircraft, including the following types: low wing with single vertical tail, a high wing model, a twin-boom model, and amphibian. In all cases, NACA is trying to make the airplane incapable of spinning, even when stalled. These studies may culminate in wide acceptance of the non-spinnable personal plane. END

Is "Omni" Best for Aviation?—No

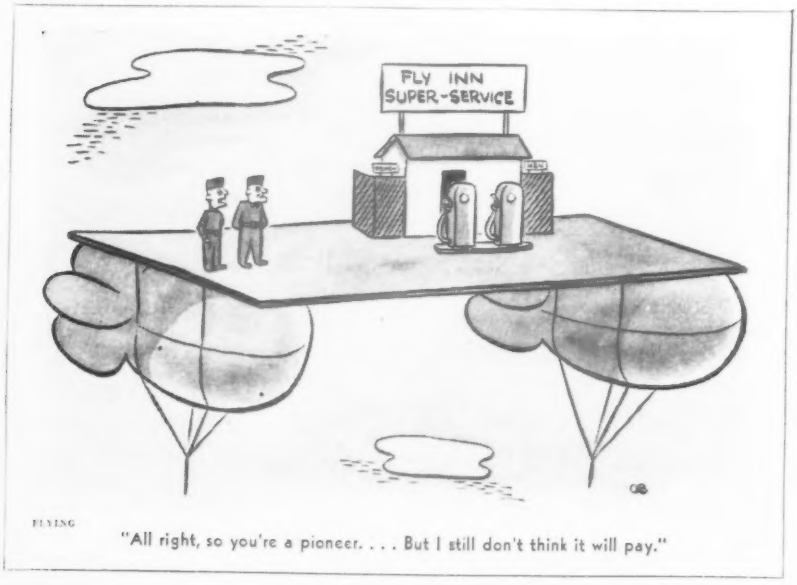
(Continued from page 17)

times called, let us compare these statements with those of the inventor of the omni. In the R.C.A. Review for March, 1946, page 110, Dr. David Luck concludes a discussion on the behavior of the omni, with the following paragraph (complete quotation):

"Omni-directional ranges *should be neither better nor worse* than others, at any given frequency, with respect to terrain effects producing bent or multiple courses. The continuous, quantitative indication provided by the omni-directional range, however, prevents such effects from ever becoming seriously confusing and facilitates determination of their magnitude and extent. The omni-directional range principle is, of course, not restricted to use at any particular radio transmission frequencies, but is of quite general applicability."

With complete objectivity, Dr. Luck states the facts in the case. He doesn't have to, and doesn't try, to apologize for the fact that his system has beam bends exactly as bad as a two- or four-course range on the same frequency. With the techniques available at the time no one in the world could have done better. (Dr. Luck's work was finished in 1941 but his article was withheld for security reasons.)

Let me say in passing that I regard the invention of the omni as a great engineering achievement, for which Dr. Luck has received too little credit. The fact that radio techniques advanced so rapidly during the war as to render the omni completely obsolete can in no way be considered a reflection on the ability of those who designed and built it.



FLYING

"All right, so you're a pioneer. . . . But I still don't think it will pay."

Present-day proponents of the omni may point out that the individual radiating elements of the original antenna have been replaced by a better design. But this same change has been made in the ILS localizer, and it *still* swings erratically when planes or trucks reflect radio waves. Also, the new type omni receiver has a circuit which eliminates "multiples" (by making the plane fly a sort of average course). But Dr. Luck's statement about bends is still sound. *The only way to cure this trouble is to design according to the antenna law.*

This is the most important point I have to make, so it should be reemphasized. The use of ultra-high frequencies automatically eliminates static but it is no panacea. It *can* eliminate reflection troubles, but only when the design is sound.

Radar sets minimize reflections by confining the transmitted signal to a narrow beam.

The omni sprays radio energy over 360° all the time. Reflective objects are therefore "illuminated" continuously. In addition, radio transmitters on the same frequency can bend the omni beam in the manner used by the RAF countermeasure experts.

As long as this fundamental point is not appreciated, the CAA can spend years in futile efforts to improve the omni. No amount of circuit improvement, no changes in the details of the antennas, will cure the fundamental trouble.

Mr. Stuart stresses the improvement caused by shrinking the antenna size. Certainly the change in size had no effect in itself; it was the accompanying "cleaning up" of mechanical and electrical details which improved the performance. No doubt this could have been done equally well with the larger antenna. There are always technical "bugs" of this sort which can be eliminated by attention to detail. They should not be confused with the *fundamental* difficulties, which can only be cured by a major redesign within the dictates of the antenna law.

If such a design were difficult to make,

if omni—while technically unsatisfactory—were the best possible system, then there would be no controversy (there was none over the A-N range for that reason). But *it is easy*, as demonstrated by the existence of about a dozen basically sound systems used in the war. These systems were proved to be practical by years of operation, long before the CAA started to install the inferior VOR. (The Army is now installing one such system, a radar beacon net across the country, which will give a much better performance than the omni.)

Having stated the case, I will now answer, paragraph by paragraph, the questions Mr. Stuart's article poses. He is surprised that a "law of physics can be violated." Let me explain. Everyone knows that water freezes at 32°F. But text books relate that under ideal conditions, when water is free of dust and turbulence, it can be "supercooled" to less than 0°F without freezing. Thus a "law of physics," which holds under ordinary conditions, can be violated under *ideal conditions*. Now if we put a speck of dust in the supercooled water, or stir it slightly, it will immediately freeze to ice.

If we found an engineer who built hydraulic machinery that had to use water at 0° F, we would conclude that his design was basically unsound. This is essentially what the CAA is doing when it uses radio aids designed outside the dictates of the antenna law. It is true that *under theoretically perfect conditions*, no harm can be done, but in this field, one must be *practical* and *safe*. The CAA has often said that there must be no "calculated risk" in civil aviation.

On the subject of specifications, Mr. Stuart and I are both aware that "specs" are written with a definite system in mind so it is never surprising that the system fills the bill.

The irrelevance to the argument of flight tests under good conditions has already been pointed out, so no comments on the Collins test are needed. However, in that section, it was pleasing to find Mr. Stuart, agrees with me that in the realm of technical matters, a man can be an "unbiased observer," even when he has "something to sell," (namely VOR receivers).

By far the most important test would be of the performance of the VOR when one side of its antenna shack was covered with a layer of snow or frozen rain, or when something was moved into the neighborhood of its tower.

One could agree with Mr. Stuart's statement about the need for a small antenna to radiate a "pattern suitable for omni ranges," if he qualified it by adding the phrase, "of the type favored by the CAA." This choice will be shown to be a poor one in a later paragraph. I have already emphasized that, as Mr. Stuart says, the antenna law is "not even remotely applicable to the VOR antenna system," *but only as long as reflections are ignored*.

In bringing up an obvious limit to the applicability of the antenna law, Mr. Stuart's position is not strengthened. He effectively stresses that the omni antenna gives patterns so poor that cutting down the antenna size still further can make the patterns no worse. The law applies accurately for antennas approximately one

"Flies in Winds that Ground Other Light Planes,"

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In Salinas Valley, California, where winds average 15 to 40 mph, an operator reports, "Ercoupes are flying when my other airplanes are grounded." This is not just an isolated instance. Operators who have tried, find everywhere that the Ercoupe can be flown in all winds short of a gale and can be operated by the average pilot, *regardless of wind direction.* If you want to be able to fly more days of the year—in greater safety and more comfort—fly the improved Ercoupe. Learn how the tricycle landing gear automatically eliminates the difficulties of strong, gusty winds *and* cross-wind operation.

The improved Ercoupe has more power—carries greater loads. It is spin-proof* —stall-resistant—and is operated by just two simple controls . . . the combination that reduces handling worries in marginal weather flying. (However, *even* the Ercoupe cannot be flown blind without suitable instruments.)

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wave wide and up. Small antennas are already at rock bottom so the pattern and the possible errors stay equally bad for all smaller sizes.

In the next paragraph we find the statement that a pilot wants to know his "bearing and distance from a given point." Pilots I have questioned have told me that they would rather know their positions on a rectangular grid than on a "polar plot." That this is also the official position of the CAA is indicated by their active development of the R/Θ computor, which converts polar data to rectangular data. In other words, the VOR-DME information is *not* "convenient to use." It can be made so only with the aid of a bulky and expensive computer. Just for the record, a Shoran computor to do the same kind of a job has been designed so Mr. Stuart's analysis of that case is in error.

In discussing rotational speeds of antennas, Mr. Stuart's logic is perfect but he comes to an incorrect conclusion because his basic premise is wrong. He starts by assuming the omni pattern must rotate rapidly—60 cycles per second is actually used. Now it takes several seconds for a plane to move far enough for its VOR indicated position to change appreciably. It is therefor obvious that nothing is gained by observing the same reading 120 times in two seconds. It would be just as well, and in fact much better, to observe only once every two seconds, and get data of greater accuracy and reliability. ("Clamping circuits" to hold the information are well known in the radio art.) Since narrow beams can be mechanically rotated faster than this, Mr. Stuart's arguments are unsound. In other words, narrow beams *are* good for omni, but not good for the *particular type* of omni the CAA has decided to install.

The "early test" I quoted is reported in Dr. Luck's 1946 article, page 102. I can't agree with Mr. Stuart's analysis of the negligible effect of an eight-mile change in indicated position during a 2,100-foot letdown. Heading toward the range station, and with a letdown rate of 500 feet per minute, a pilot would have to believe that he was suddenly in a 120-m.p.h. cross wind or else lose faith in VOR. There is also loose thinking in minimizing the effects of beam swings. Mr. Stuart correctly states that these errors would be common to all aircraft using the range and so no collisions could result. Unfortunately, *mountains do not move around in such a way that their VOR indicated positions remain constant!*

I have already discussed VOR errors, so do not have to answer the next paragraph.

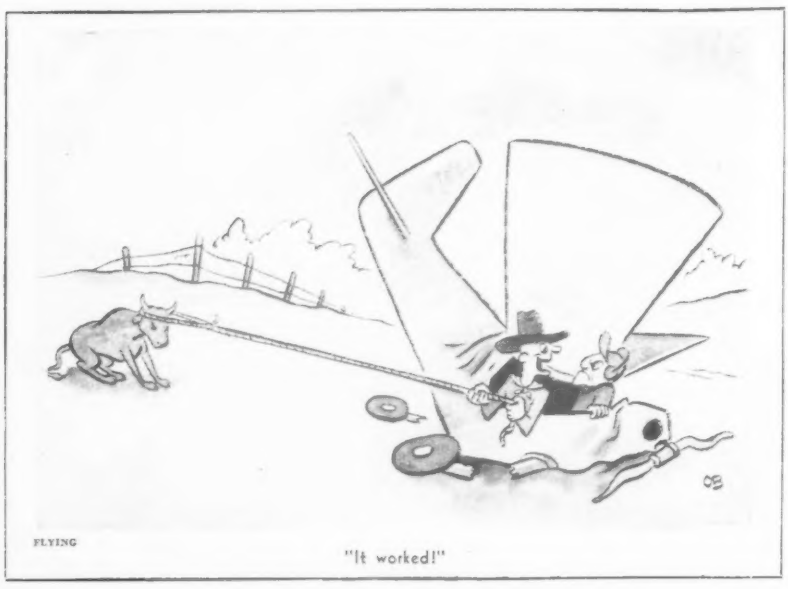
In the last paragraph, the question is asked, where is it possible to buy equipment with 500-foot accuracy? Several oil prospecting companies have recently bought RCA's Shoran equipment, which will do considerably better than 500 feet at 50 miles. It is DME in every sense of the word in that it *measures distance*, and does so in the DME manner, by sending pulses to a ground station which in turn sends them back.

Finally, I would like to comment on Mr. Peter Caporale's letter to the editor of FLYING, [May, 1948]. He has two objections to the use of certain words in the original article, and as these are not of general interest, I have answered them privately. All other points seem to be covered in this article, so I should like to close by disagreeing strongly with the following sentence from his letter:

"What *is* of interest is not the maximum error under worst conditions, but the error to be expected under *normal* operating conditions."

Mr. Caporale is chief of the CAA's Radio Engineering Section. But he signs his letter as a private citizen so this can only be considered his personal opinion. I too am writing as an individual, not having discussed these matters with anyone actively interested in navigational aids.

Let us hope that *officially* the CAA *is* interested in the performance of its radio aids under the worst conditions. Mr. Stuart's article does not convey that impression, and he writes as a responsible Civil Aeronautics Administration official. END



"It worked!"

Aviation's Race Against Time

(Continued from page 13)

B. The average time lag from initiating construction on a new aircraft plant until the first airplane was rolled out the door was one and one-half years.

C. The aircraft industry produced half of the aircraft engines and 90 per cent of the airframes assembled.

D. Industrial facilities of large and small non-aircraft plants were drawn into production of air materiel. As the war progressed, non-aviation sources produced an ever-increasing proportion. The automobile industry, for instance, made about 10 per cent of our planes, half the total engines, and a substantial share of airframes. But approximately three years were required to reach peak output.

E. Every World War II plane and engine was on the drawing board or in development prior to Pearl Harbor.

Our problem today: to find a way to reduce to less than two years the production acceleration process which required five years in World War II. That is the goal of the peacetime industrial planning program.

To make the program work, the Air Coordinating Committee has recommended that we have four things:

1. Research, closely coordinated with production and testing.
2. A healthy aircraft industry able to expand rapidly.
3. Reserve production facilities and resources in allied industries.
4. Specific industrial plans to maintain our newest air weapons in a state of readiness for volume production.

Research and development alone means nothing from a military standpoint. Industry must do more than make experimental versions. Design engineering and production engineering must be integrated —the plane model must be so designed initially that it can be built in volume without redesigning.

Production of the model will enable the manufacturer to production-test it. The existence of a certain minimum number of the model will allow the Air Force to test the plane's operational and tactical characteristics. In our planning, we must realize that blue prints will not fly, and experimental planes cannot win an air war.

In nearly four years of war this country failed to complete the cycle of designing, engineering, developing, manufacturing and combat-testing a single airplane. The average period of design-to-combat test was five to seven years.

The history of the B-29 is a classic example. Initial design work was started as early as 1938, the year of Munich. Two years later, about the time of Dunkirk, the plane went through its wind tunnel test. Construction commenced in 1941, before our entrance into the war. The B-29 was first flown in 1942. Production began in 1943. The plane entered combat in 1944, but it was not until 1945 that it became a major factor in the air war.

The record of the *Thunderbolt* is an-

other, showing the years required to get a plane from the drawing board to volume production. The plane was ready for production in 1940. It was one year before the P-47 was test-flown—two years before acceptance of first model—three years before the plane entered combat—and four years before desired manufacturing volume was realized.

The aircraft industry in 1938 ranked 44th among U. S. industries on the basis of volume of business. By 1944 it was number one. Since V-J Day, obviously, it has gone back down the line.

A minimum level of military aircraft production must be sustained, however, if we are to keep our defenses in order. At least 3,000 military planes annually, plus civilian aircraft production, should keep the industry healthy. By contrast, 3,000 planes were produced in less than two weeks during wartime peaks.

Such a program provides a broad base from which producton could be expanded rapidly and insures a sustained flow of aircraft replacements.

During the war the U. S. invested nearly $4,000,000,000 in aircraft manufacturing plants. A number of large, modern, and strategically located airframe and engine plants were constructed and their disposition presented a great problem.

A reserve of aircraft plants has now been established. Steps are being taken to have comparable reserves of plant capacity in various other industries concerned with aircraft production.

There is the collateral problem of war-made machine tools, surplus in a peacetime economy. The armed services are storing a number of these for possible future needs. A total of 47,860 items of machinery and equipment has been authorized as an Air Force industrial reserve. Many have already been selected from Government-owned stocks and prepared for long-term storage.

The Air Force is also participating in the national program for stockpiling strategic and critical materials, and space has been set aside to store them.

Our goal is to reduce the time needed to achieve volume production, after the Air Force has placed a production contract or given its "go-ahead."

Complex problems face a manufacturer in reaching large scale production on an airplane. By solving production problems in advance, and preparing for the necessary steps through which an individual manufacturer must go, many valuable months can be saved.

The Air Force is obtaining industry's ideas—which will speed things up. The Air Force is also working with aircraft and allied industries in selecting the equipment that each company will produce and the rate at which the item will be produced. Plans will be projected to arrange for potential subcontractors, especially among small manufacturing concerns. Prospective licensees also will participate.

But the program can succeed only with the support and participation of industry, and an understanding and appreciation by the general public of its fundamental necessity to the security of the nation.

Air industrial preparedness planning is the first milestone on the road to national security. END

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Trouble for Fly-By-Nights

(Continued from page 37)

position of all important switches and controls by memory, so that he can readily find them in a dark or dimly-lighted cockpit.

Although getting the pilot's eyes accustomed to the dark and keeping them that way are important steps in the ritual of flying after sundown, they don't transform night into day. The next difficulty lies in the fact that unless visibility is good, and the horizon can be used as a reference, flying at night is strictly on instruments. Getting caught in these circumstances was a frequent wartime headache for military pilots. Inability to fly instruments was an accident factor nine times more often at night than in daylight. Getting lost was another frequent difficulty. The familiar daytime check points can't be depended on at night; highways and railways disappear, and rivers as well, making it easy for the contact flyer to lose his way. In the AAF during the war, pilots in training got lost six times more often at night than in the daytime; and Army flyers abandoned their planes eight times more frequently in the dark than when they could see what they were doing. So while on a clear night it is elementary to tell the stars from the street lights, too many nights are the kind that make down indistinguishable from up, and coming seem the same as going.

But the night flyer is subject to further annoyances. For example, there is a night blind spot in the center of the eye which makes it impossible to see what one looks at directly. In the dark a person has to look to one side of what he wants to see. Failure to do so may explain the frequent collisions on the airport at night, especially when aircraft are parked close together. Depth perception is also apt to be unreliable, with hard landings a frequent result of leveling off too high and stalling in. Also important is the fact that night vision is seriously impaired above 5,000 feet without the use of oxygen, and at an altitude of 12,000 feet the eyes are only 50 per cent as good as they are on the ground. The difficulty of seeing storm areas which would be avoided in daytime is another problem, and a sudden flash of lightning may be temporarily blinding.

There are still other circumstances which affect performance in the air at night. Pilots are more susceptible to dizziness in the dark, and it is easy to have a mistaken sense of position and to become confused by lights inside the airplane or on the ground. One night recently a pilot landed his BT-13, and, incidentally, his wife, in the middle of the Ohio River, mistaking the lights along the shore for runway markers. Statisticians can prove that mistaking almost anything for a nice airport is one of the easiest things to do in the dark. And, strangely enough, preoccupation with other matters during night landing causes numerous pilots to forget to lower their landing gear. In the Air Forces, belly-landings tripled at night, partly because the pilot forgot to use his check list or couldn't see it. Then, as an added factor, the tower was unable to see what was up in time to warn the pilot to get it down.

The problem of seeing well enough at night to get from one place to another isn't peculiar to flying. Back in the early days of the automobile there was the same difficulty of overcoming this obstacle to full use of the vehicle. The motorist avoided the highways after dark, just as he stayed home when it snowed. Until 1906, lights on the horseless carriage were a curiosity and trouble at night was infrequent because no one was fool enough to venture out after dark. By 1912, however, electrical lighting was introduced as standard equipment on one of the most expensive cars, doing away with kerosene lamps which generally faltered when you needed them most.

"STUDENT - PILOT"

ERIC Linhoff is one New York University student who gets around. During the week he attends classes. But on week-ends he's just as apt as not to be in Europe. Each week he logs a full time classroom load of 14 hours and a full-time flying schedule of about 35 hours for Pan American Airways.

Linhof, 25, flew B-24s for 3½ years. Then he went to work for Pan Am. He often climbs into his plane with several classroom books in his bag and bones up on his lessons during an overnight stay in London. He spent Christmas in Calcutta and has recently flown to such far distant places as Johannesburg, South Africa, and Leopoldville, Belgian Congo. He's slated to be graduated from New York U. in June and expects to enter the graduate school there in the fall.

Automobile ads boasted that finally a solution had been reached. "Press a button," they said, "and the brilliant electric headlights illuminate the road." But for many years the substitute offered was still inadequate for the job. Even the heralded post-war models of that day were not properly equipped for driving after dark. They had plain glass lenses and depended on a magneto operated by the flywheel, so that the ray of light varied from bad to worse as the engine slowed down. And even in the city, street lights in those days were little help, giving only about three or four per cent of the illumination you get from a sodium or mercury street light today.

Even now, with 60,000,000 headlights and 4,000,000 street lights, the automobile hasn't altered the fact that people weren't designed to see as well at night as in the daytime. We get around at night, to be sure, but most of the time we are driving at a speed which requires more stopping space than the distance our headlamps throw their beams. These facts are evident in the accident record. On the highways only 30 per cent of the travel is at night, but this travel accounts for 60 per cent of the fatal automobile accidents. In similar fashion, most military aircraft models flying in the U. S. during the war had accident rates two to four times higher at night than in the daytime. For the same amount of flying there were four fatal accidents in daytime operations compared to 10 at night.

Fortunately, the airplane has some advantages over the automobile in the battle against the forces of darkness. It doesn't need headlights to shed light on its forward path, except while landing on unlighted runways, because it is not restricted to a narrow roadway or exposed to the dangers of pedestrians or fixed objects along the traveled way. And the pilot isn't going to have to worry about headlight glare.

What he needs is position lights, the same as a boat, to let the other fellow know his whereabouts, although it should be pointed out that stationary lights are hard to see and any light is hard to see when two fast aircraft are flying head-on. In addition, of course, he needs lights on the ground to guide him, and some night substitute is required for the air markings which serve so well in daytime. There are 35,000 miles of lighted airways in the United States now, and these light lines do provide a visible check for the night pilot who uses them.

They consist of beacons 10 to 15 miles apart along the main intercity routes, with code signals which flash their identification. But obviously these facilities are of limited help to the private pilot, unless he confines his visiting to fair-weather friends conveniently located on the airways. Too, the Congressional Air Policy Board has recommended elimination of these airway lights.

Judging from the present concensus of Washington experts, it seems fairly clear that most private pilots are going to be eating leafy vegetables and sitting in dark rooms for some time to come if they choose to go forth at night. Most of the experts are busy with instrument approach problems, radar, and television for the commercials. The little ones, they say, should be tucked in early, unless the moon is bright. With a moon they can play ring-around-the-airport.

Some steps are being taken to make it easier to find the small airport at night and to use it safely. The CAA has developed a two-color tubular boundary light which indicates the presence of an airport to a pilot 15 to 18 miles away, flying at 1,000 feet. The tubular lights used for these installations mark the outside boundary of the airport

green, and the inner boundary red, showing the pilot that he must clear the red line on take-off and that he may land after clearing the green.

These lighting units may be placed at intervals considerably greater than the usual 300-foot spacing of boundary lights. A new kind of gas tube light containing especially purified neon gas is used for the red light, and a similar tube filled with argon gas is used for the green. Lights are mounted in front of reflectors and are 20 times as bright as the neon tubes used in electric signs. According to CAA they have been seen as far away as 30 miles at 1,000 feet, under exceptional conditions.

Other CAA lighting experimentation includes development of range lights to indicate wind direction and velocity, as well as proper approach and glide angle. But when it comes to the airplane itself, few persons are willing to go further than to predict the general use of landing lights on personal aircraft. Until we arrive at solutions to a lot of other problems staring us in the face in broad daylight, they say, the problem of private flying at night is not going to receive much exclusive attention. Then when the daylight situation is in hand, the importance of round-the-clock utility will be magnified, just as it was in the case of the automobile. No one worried about how to drive a car in the dark until it was settled that internal combustion would take you there and back when it was light.

What is the answer for the private pilot who wants to fly at night? Already science is pointing to several possibilities. In Teleran, the new experimental application of television and radar to air navigation problems, the private flyer can look for possible relief. So far the expected cost will be steep—around $500 per plane as a guess. Teleran provides a screen for the pilot on which he sees the image of his own plane in relation to his surroundings, including terrain and other aircraft. By watching the screen he not only can avoid collisions but he can find his way to his destination in darkness and bad weather.

Another possible solution may be in the use of infra-red light, a secret night-seeing device which we learned about from captured German documents and equipment. This is the device which permitted our soldiers late in the war to see the enemy at considerable range despite total darkness, much to the consternation of the Japanese. The infra-red equipment found in Germany was designed for mounting on an automobile or tank and was used for driving in complete blackouts at any speed the vehicle could maintain. By this device the road was visible clearly for about 328 feet, and most objects could be seen at approximately 656 feet. Infra-red lights were also the subject of experimentation for aircraft, the intention being to install them on wing tips to permit the pilot to locate and identify other planes. The urgent need for finding our way at night is certain to exert continuing pressure for further scientific progress.

In the end it might turn out that the same developments which permit more reliable aircraft performance in the daytime will also enable night flying problems to be

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overcome. Specifically, some engineers believe the eventual ability of an airplane to fly slowly may be one of the principal aids to flying at night. Slowing the airplane will permit it to grope its way in the dark the same as everyone else.

The helicopter has already accomplished this objective, and slowing down the conventional plane is likewise possible. According to John Geisse, formerly of the CAA, this can be done easily by the use of several small props instead of one large one, so located on the wing as to provide sufficient air-flow to overcome the stall. On the assumption of Langley Field engineers that jet propulsion will be practicable for lightplanes, this principle might be applied to the jets. And looking ahead some more, an increasing number of persons believe that the combination road and sky vehicle of the future will be one way out of the dark, permitting a ready choice of travel by land or air, depending on weather and the time of day.

How soon an air-borne vehicle will appear which can work the night shift with impunity is a matter of conjecture. But, going on the assumption that the nights aren't getting any shorter, it's a cinch that the problem of travel after dark will have to be solved before private transportation moves into the air in large volume. Meanwhile it looks like the best advice for the majority of aircraft owners is to leave the lightplane in the hangar at night. But it may not be for long. END

Russia Steals the Superfort

(Continued from page 29)

to China. Instead, the 11 men were hustled off to be questioned by Red intelligence officers. Before long they found themselves interned in a camp at Tashkent, in Turkestan, near the fabled cities of Bokhara and Samarkand. Here, altogether, 131 American airmen were held during the war. Here, too, was Captain Howard R. Jarrell, and his crew, whose *Superfort* was the first the Russians had seized. It had run low on gas during a raid against Mukden in July, 1944, and also had landed at Vladivostok after the characteristic greeting by "friendly" antiaircraft fire. There also was First Lieut. (now Capt.) William J. Mickish, whose *Superfortress* landed at Vladivostok a few days after the *General Arnold*.

Lieutenant Mickish flew over Vladivostok at about 5,000 feet giving the international radio signal for "friend." He circled about hunting for an airport, and weather was closing in fast when the bombardier excitedly pointed out a B-29 on the ground below. It was Captain Price's plane.

Mickish decided to land, and went through the characteristic B-29 landing procedure which should have been plain enough to the Russians on the ground. He was in the landing circle, and had his gear lowered at 500 feet when the waist gunner reported they were being fired at by antiaircraft. Mickish came on in, though six Yak fighters which had come up began shooting at him.

"When we were forced down it was 3 o'clock in the afternoon and broad daylight," Lieutenant Mickish is quoted in the New York Times. "First the antiaircraft batteries started sending flak at us, although they could see we were an American ship and that I had my flaps down for a landing.

"Then six fighters came up and the leader began spraying tracer bullets around our nose. My boys didn't like it. I had a hard time getting them to keep their trigger fingers off their guns."

The 11 crew members were treated virtually as prisoners. They were taken to an airport administration building and ordered to surrender their sidearms, ammunition and knives. Then they were interrogated by eight Russians. They were given a sumptuous meal, then interrogated again.

Mickish and his crew were puzzled by the attitude of the Russians. They had expected to be among friends, "but somehow they didn't seem friendly." There were no specific directives on the Russian situation, but the B-29 pilots had had an idea that they could get repairs in Vladivostok and then would be allowed to proceed on their way.

They soon found out otherwise. Mickish asked repeatedly for the American consul at Vladivostok. Finally the consul himself, O. Edmond Chubb, appeared. He confirmed their increasing suspicion that they would never see their plane again. The Soviets, even though U. S. allies, were interning the bomber.

The Russians gave them heavy clothing, assigned them an interpreter, and moved them to Khabarovsk, a 24-hour train ride. Here they met Captain Price's crew. The 22 American aviators left for Tashkent December 6 on a 12-day trip on the primitive Russian trains. At a former officers' camp at Tashkent they were housed and notified that guards were patrolling the boundaries for their own "protection." In January, in a Soviet-approved plan, they were "smuggled" out and delivered across the border at Teheran. There they were deloused, fed and sent to Cairo.

From these three incidents, the Russians came by three intact B-29s. At least one other is known to have crashed on Siberian soil after its crew parachuted to safety.

The Soviets, being allies, might have stretched international law a bit, gassed up the friendly American bombers, and sent them on their way back home. Strictly according to international law, they probably had the right to intern both planes and crews, but the Russians are not generally considered to be sticklers in that respect. Certainly after they declared war on Japan, it would have been a friendly gesture to return the planes to the United States.

But, as it turned out, they had other plans.

What these plans were has been revealed by a series of glimpses behind the Iron Curtain.

The first hint came in 1946, when Russian representatives approached an American aircraft company and tried to place an order for B-29 tires, wheels and brake assemblies.

The second hint came two years to the day after the *General Arnold* sought haven at Vladivostok. On Armistice Day, 1946, the Berlin newspaper *Der Kurier*, quoting dispatches from Paris, declared the Russians were producing copies of the B-29 in the Far Eastern Ural state aircraft factories.

Then, during the 1947 Soviet Aviation Day parade at Tushina Airdrome, Moscow, last August 3, several unusual new Russian aircraft appeared. U. S. observers there reported they were B-29s, and Gen. Carl Spaatz, Air Force Chief of Staff, confirmed later that their number was "definitely more than they came by from us."

The new planes were first positively identified this winter when Russian newsreels shown in Britain introduced the new Tupolev Tu-70, a 72-passenger transport. A writer for the British "Aeroplane Spotter" noticed the similarity between the Tu-70

FLYING "Is he still comin'?"

and the B-29 and had prints made from the film. Since then, the Soviets themselves have released photographs of the plane, supposedly the design of Andreas N. Tupolev.

This "Russian B-29" is fantastically similar to the American *Superfortress*. There is no possibility of doubt that it is based upon the B-29. Boeing designers say that more than 20 Tu-70 items are identical with those of the B-29.

In the February Boeing Magazine, Reynolds Phillips describes the similarity of the two planes as follows:

"The famed Boeing 117 airfoil that the Tu-70 is sporting is an exact replica of the Boeing B-29 wing. Along with the wing are the *Superfortress* nacelles: outline, cooling air intake, auxiliary air scoop, cowl flaps and inboard and outboard fairings. The cabin cooling air inlet in the wing leading edge between the body and the inboard nacelle is the same. The trailing edge extension on the flap between the inboard nacelle and the side of the fuselage are also identical, according to the evidence provided by the photographs.

"The Tupolev Tu-70 uses the Twenty-nine's main landing-gear structure as well as its fairings and doors. The nose gear also appears to be that of the *Superfortress*, with the upper trunnion located closer to the body contour of the Tu-70 than on the Boeing bomber.

"The tail surfaces of the Russian transport also come direct from the Boeing engineering department. On comparison it is apparent that the vertical tail and the dorsal outline as well as the leading edge of the rudder are the same on the two planes. The rudder of the Tu-70 appears to end at what would be the top of the tail gunner's doghouse on the *Superfortress*. The shape of the stabilizer and the elevator is the same on the two ships, and the transport also uses the inverted camber of the B-29's tail.

"Propellers of the Tupolev Tu-70 appear to be original B-29 props, less cuffs. The hubs are characteristic of the Hamilton-Standard design. Boeing engineers also report that the drift meter installation of the Russian transport looks like that of the *Superfortress*, and the pitot head type and location match.

"Tupolev did, however, design a new fuselage for the transport. It sits higher on the wing of the Tu-70 than does the fuselage of the B-29, and the fuselage is larger in diameter and a little longer (119 feet as compared to 99 feet). While the transport has a new fuselage, it retains the bomber nose, including the bombardier's plate-glass window."

There are at least three reasons for suspecting that bomber versions of this plane are also in production. First, the Russians have recently been at pains to make available information and photographs of the Tu-70—all of which data stresses that it is a *transport plane!* Though development was concealed for at least two years, it is almost as if the Soviets, now knowing that we are acquainted with their secret, are taking the trouble to assure us that of course they are building the plane but it is only a transport.

The second clue lies in the "B-29s" that trained military observers reported seeing

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at the Soviet Aviation Day parade last August. Were these military bombers or were they really the Tu-70s? It hardly seems possible that trained observers could mistake the two planes, especially since the fuselage is markedly different and is located at a different position on the wing.

The third clue lies in the fact that the Tu-70 continues to use a bombardier's nose identical with that of the B-29. Why would such a nose be necessary on a transport plane?

The Russians had one modern four-engined bomber during the war, the Tupolev PE-8, which was considered generally unsuccessful and was not widely used. They would be eager to have such a successful design as the B-29.

There would certainly be nothing unusual for them to have both transport and bomber versions of the plane in production. They have often developed both transport and bomber versions of the same basic model.

Here is what the British "Aeroplane Spotter" has to say about the Tu-70, which the magazine calls a "transport," being careful to keep the word in quotes.

"Because this prototype is intended to test civilian application of the design (except for the pressurized nose section containing crew of five), the fuselage is longer than the bomber version, about 119 feet, although the wing span remains at 141 ft. 8 in. One result of this lowering of the wing position has been the generous increase of the wing root fillet.

"Taken all round, the Tupolev Tu-70 is a workmanlike design and external finish appears to be excellent. Pilot's forward view seems to be enhanced by the redesigned step-down cockpit. . . . No doubt after an intensive period of research and flight testing, the fully cilivianized Tu-70 will appear on the air routes."

Although the Russians do have actual examples of America's finest wartime bomber to guide them in their own redesign, and even though they are reported to have set up jigs and dies to put the plane into quantity production, they still have an extremely difficult engine problem.

The 18-cylinder Wright engines with which the planes were equipped have been difficult to manufacture and were many years reaching desired standards of reliability. Even if the Russians copy them exactly, putting the engines into quantity production is probably several years off if quality and dependability are to be achieved.

When they do succeed, however, the Soviets will have a formidable weapon—second only to the Boeing B-50s and the Convair B-36s which are only now going into small production in this country. There can be no discounting the quality of the "Soviet B-29"—after all, America designed it! END

Missouri's White River Country

(Continued from page 35)

bathing beaches, tennis courts or for fishing. Boats can be rented and guides and bait are available. Bowling costs 15 cents per line—and the resort also conducts trips to Fairy and Marvel Caves in the Shepherd of the Hills country. From Decoration Day through Labor Day, Rockaway Beach maintains what is claimed to be the "largest dance band anywhere in the Ozarks."

Reservations should be made in advance. A deposit of $10 is required on each room reserved. The Rockaway Beach Chamber of Commerce will furnish a list of approved accommodations.

Harold D. Weatherly, aviation engineer for the State of Missouri, says the best way for lightplane flyers to reach Rockaway Beach is to fly to Branson Airport, take a taxi to the Branson Boat Dock and a speedboat to the beach. Although the taxi will make the entire trip, cost is greater, since the distance is 20 miles.

Seaplane or amphibian pilots should take extra precautions landing on Lake Taneycomo because wires are stretched across the lake at seven points. Planes do land on the lake, however, and with advice of nearby airport operators the pilot can choose the best place to set down.

E. John Dean, operator at Branson Airport, will assist flyers to obtain transportation to any point in the Lake Taneycomo area. He suggests that June and July are best months for the FLYING vacationist. Days are warm, nights cool, and prevailing winds are from the southwest with an average velocity of about six m.p.h. Hangar space is $1 per night but there is no landing or tie-down fee. At nearby Hollister, Branson and Forsyth cabins are available.

Dean points out that the airport is not only near Rockaway Beach but is considered the "Gateway to the Shepherd of the Hills country," made famous by Harold Bell Wright's book. Still much the same as described in the novel are Jim Lane's Cabin, Mutton Hollow, Sammy's Lookout, Dewey Bald, Old Matt's Cabin and Marvel Cave. Branson is also headquarters for float trips down White River. The Branson Chamber of Commerce (Box 607, Branson, Mo.) has information on rates and duration of various trips.

Roaring River State Park (only about 35 miles east of Rockaway Beach) is a 2,720-acre tract where a giant spring gushes 20,000,000 gallons of water annually to create Roaring River, an eight-mile angler's delight. One of the country's largest trout hatcheries is located here.

Cassville Airport (which has three runways, one 2,300 feet long) is four miles from the park. Information on accommodations can be obtained from Evan A. Shore, manager of the Lodge at Roaring River State Park, or from William Lathim, Jr., secretary of the Cassville Chamber of Commerce.

In the southwest corner of Missouri scores of persons are flying into the Noel area. Joe Taylor, editor of the Ozark Press at Noel, says that the local Chamber of Commerce is exerting effort to attract aerial tourists. "Regardless of interest," Taylor says, "the vacationist will find the Elk River area at Noel a mecca: There is swimming in Elk River, and there are miles of bridle paths for those who like to hike or

ride. A dozen major caves, rich in underground formations, are in the immediate vicinity. And all over this part of the country we have modern lodges and hotels."

Until this year flyers were forced to land in wheat fields but ex-Army flyer Kenneth Shook has opened an airstrip (Kenwood Airpark) just two miles from Noel. The strip has just been completed and has a 50-cent overnight tiedown charge (no fee during the day). A four-plane hangar is under construction.

Shook points out that numerous cabins and several tourist hotels are located on Elk River at Noel, and that transportation into the city from Kenwood costs only 75 cents. Shook can direct flyers to other points of interest, such as Grand Lake in Oklahoma (15 miles); the Bluff Dweller's Cave at Noel, the Old Spanish Cave south of Sulphur Springs, Ark., and the sites near Noel which were used for filming the movie, "Jesse James."

East of Lake Taneycomo about 50 miles, Norfork Lake juts down into Arkansas and has excellent fishing waters on the Missouri side of the border. Gainesville Airport, near the northern part of the lake, has only an 1800-foot runway with no facilities—but the lightplane pilot should receive service aplenty if he uses Gainesville as a base for a Norfork Lake vacation. Mayor H. T. Harlin of Gainesville says, "We try to assist flyers coming through Gainesville by giving them detailed information, furnishing free rides from the airport to the city (and back), and by furnishing a large amount of transportation to other points. The local Lion's Club cooperates in this venture by contributing transportation to flying tourists."

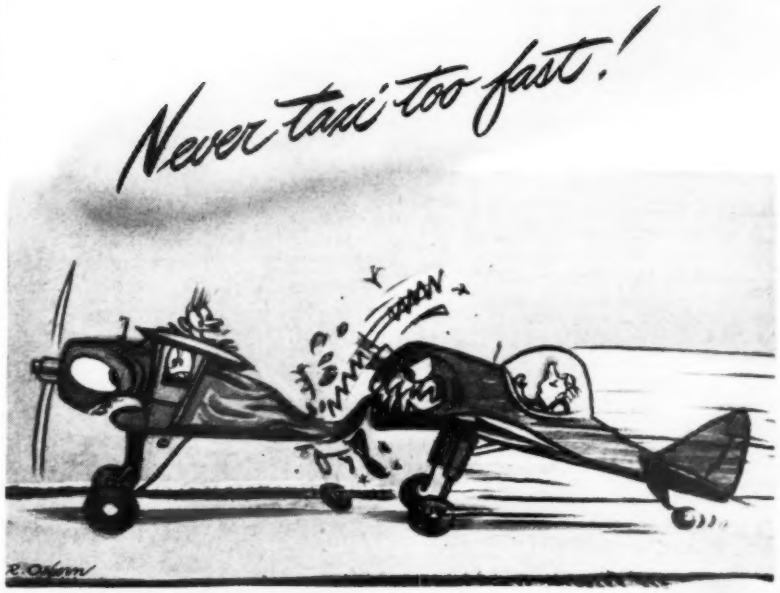
There are no airport fees at Gainesville and there is no gasoline on the field. Pilots can obtain automobile gas, however, directly across the highway at a filling station. The attendant at the station will also phone to Gainesville for transportation. Resort information will be furnished on request by the City of Gainesville.

Among other airports in the White River country are:

OZARK SKY RANCH (Eureka Springs, Ark.)—There's no tiedown fee at the Sky Ranch, and transportation to town (nine miles) is furnished without charge. Longest runway is 2,350 feet. Hotels (Basin Park or Crescent) charge $4 for a double room. Cabins are the same price but tourist home rates begin at about $2.50 for a single.

SKYHAVEN AIRPORT (West Plains, Mo.)—Airport Manager C. P. Baker keeps tab on resort facilities in his section of the country and will direct tourists to any part of the region. He's able to give directions for pilots who may want to fly to either Lake Taneycomo or Roaring River Park. Baker also maintains a small field on Lake Norfork, and can give information on the best way to fly there. If pilots prefer, they can tiedown at Skyhaven and drive to Norfork Lake (transportation costs $10 for four persons). Tiedown is 50 cents per day, hangar fee $1.50. Hotels in the vicinity of the airport have rates ranging from $2.50 per night. For cabins, the charge per person is about $3.50.

SPRINGFIELD MUNICIPAL AIRPORT — Lester Jones, manager of the airport, suggests Springfield as a base for tourists flying into



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the Southwest Missouri Ozarks. "We will make an effort to keep first-hand information on smaller fields nearer points of interest," Jones says. He will also make reservations for accommodations should flyers wish this service, and will make no charge for tiedown of private or chartered planes. The field has two runways, the longest 5,600 feet. Major and minor repair services are available on the field on a 24-hour basis. Hotel rates in Springfield range from $2.50 to $3.50 per person.

good cabin court with a drive-in theater next door. Adjoining the airport on the north is an 18-hole golf course which has a 50-cent greens fee. Next to the golf course is a swimming pool and five concrete tennis courts.

In addition, Harper Airport operates an auxiliary field on Grand Lake (30 miles from Joplin). The strip is on the lake shore. Tiedown at Harper is free, hangar fee $1 per night.

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Aurora Airpark (36°57'-93°40')		Aurora 2.5 mi.	Three	2,400 ft.	80 oct.	Major and minor repairs.	Manager, Aurora Airpark, Aurora, Mo.
Branson Municipal (36°40'-93°10')		Branson 3 mi.	Two	2,600 ft.	80 oct.	A & E mechanic.	E. John Dean, Manager, Branson Municipal Airport, Branson, Mo.
Cassville Airport (36°37'-93°51')		Roaring Springs State Park 4 mi.	Three	2,300 ft.	80 oct.	Repairs, A & E.	R. F. Woolaway, Manager, Cassville Airport, Cassville, Mo.
Ozark Sky Ranch (36°28'-93°49')	4021	Eureka Springs, Ark. 9 mi.	Two	2,350 ft.	80 oct.		Tom Hayde, Manager, Ozark Sky Ranch, Eureka Springs, Ark. (Reservations necessary.)
Gainesville Airport (36°36'-92°21')		Gainesville 2 mi.	One	1,800 ft.			Lion's Club, Gainesville, Mo.
Harper Airport (37°08'-94°35')	2010J2	Joplin, Mo. 21½ mi.	Four	3,000 ft.	80 oct.	Repair shop with complete facilities.	T. R. Kruger, Manager, Harper Airport, Joplin, Mo.
Joplin Municipal (37°09'-94°29')	207	Joplin, Mo. 4 mi.	Two	4,250 ft.	80-91 oct.	Repairs.	Ralph L. Nolan, Manager, Joplin Municipal Airport, Joplin, Mo.
King Airport (37°20'-91°58')	None	Houston, Mo. ¾ mi.	Two	1,850 ft.	80 oct.		H. R. Rosy, Houston, Mo.
Marshfield Airport (37°21'-92°52')	None	Marshfield 1 mi.	One	1,800 ft.	80 oct.		H. O. Pearce, Marshfield, Mo.
McFarland Field (37°10'-93°15')		Springfield, Mo. 4 mi.	Four	2,900 ft.	80 oct.	Major and minor repairs.	
Monett Airport (36°56'-93°55')	641	Monett, Mo. 1¼ mi.	Three	2,700 ft.	80 oct.	Minor repairs.	James W. Dalton, Manager, Monett Airport, Monett, Mo.
Myers Field (37°08'-94°18')	4660	Carthage, Mo. 2 mi.	Three	2,400 ft.	80 oct.	Minor repairs, charter.	Chamber of Commerce, Carthage, Mo.
Kenwood Airpark (36°32'-94°31')	36F4	Noel, Mo. 2 mi.	One	2,450 ft.	73 oct.	A & E, minor repairs (on request from Noel).	Kenneth L. Shook, Manager, Kenwood Airpark, Noel, Mo.
Owen Airport (37°11'-92°43')	118F2	Seymour, Mo. 3 mi.	Two	2,100 ft.	80 oct.	A & E.	Harold Owen, Manager, Owen Airport, Seymour, Mo.
Skyhaven (36°45'-91°53')	17F2	West Plains, Mo. 3 mi.	Three	2,400 ft.	80 oct.		C. P. Baker, Box 5, West Plains, Mo.
Springfield Municipal (37°14'-93°23')	3-2266	Springfield 5½ mi.	Two	5,600 ft.	80-91-100 oct.	Major and minor repairs.	Lester Jones, Manager, Springfield Municipal Airport, Springfield, Mo.

HARPER AIRPORT (Joplin, Mo.)—Harper Field, directly west of Joplin and on the western edge of the White River Country, is managed by T. R. Kruger who points out: "Our field personnel are all friendly, efficient people who make it their business to welcome and assist visitors to the Ozarks." Kruger believes the field has much to offer the FLYING vacationer. Immediately across the highway from the airport is a

—Also at Joplin is the Municipal Airport, managed by Ralph L. Nolan, an active member of the Aircraft Owners and Pilots Association. The field has two paved runways, the longest 4,250 feet long. Nolan has data on resorts throughout the White River country and is able to give assistance to tourists. Lake Taneycomo is 95 miles from Joplin, and bus fare (for pilots who prefer to tie their planes down at the larger

Joplin airport) is $3.15. Fifty miles from Joplin is the Noel resort area; and 53 miles east is Roaring River State Park where both hotel and cabin rates begin at $2. The Roaring River Park, Nolan says, has exceptionally fine trout fishing from March 1 to November 1.

MONETT AIRPORT (Monett, Mo.)—Located conveniently north of the Noel resort area, Roaring River Park and Lake Taneycomo, the Monett Airport is operated by the Carthage, Mo., Air Service. James W. Dalton, airport manager, will assist flyers in planning trips from Monett—and will also make arrangements for special trips. Hotel rates in Monett are $1.50 for rooms without bath and $2 and $2.50 for rooms with baths. There is no tiedown fee, and charge for hangar is $1 per night.

OWEN AIRPORT (Seymour, Mo.)—Harold Owen, airport owner, has two 2,100-foot sod strips, with A&E service—and has made special arrangements for FLYING Holiday rate reductions during June. Gasoline (80 octane) will sell for 25 cents per gallon and oil for 30 cents per quart. Owen has also obtained special rates from a Monett cafe and tourist home, the Sky Line: $1 for rooms, during June. Reduced rates on meals will also be in effect during June. Tiedowns are free; hangar fee is $1 per night. Transportation into Seymour (three miles) is free. Owens suggests that fishermen will be interested in a lake near Hartville, Mo., 18 miles from the airport. "The fishing's good—and the lake doesn't have the crowds which flock into the better-known resorts." Owens will help flyers find the good locations for either fishing or camping.

Sectional required for the White River Country of the Southwest Missouri Ozarks is the Tulsa (S-6) chart.

CHARLES L. BLACK

The Cessna 170

(Continued from page 33)

sea level. In the air, the 170 is about as stable as you'll ever want it. It's so stable it actually resists maneuvering. It takes a more-than-average amount of control movement to change the 170 from straight-and-level flight. In addition, the controls have been deliberately "tightened-up" so as to keep the amateur from mauling the airplane all over the sky, especially during approaches and landings. The 170 is actually a "trim-tab and hands-off" airplane, and a normal approach and landing is made simply by trimming the nose high, letting the airplane settle down into a steady glide (about 70-75 m.p.h. indicated), then using the control wheel very little. In a normal glide without flaps the 170 undoubtedly could land itself with no trouble at all. With flaps down, though, you just ease back slightly on the wheel and the plane does the rest.

In cruising flight the nose sits very low, another point the average pilot will have to get used to. It took me some time to get the nose down to where I wasn't continually climbing. But once the nose does get level, the 170 really steps out. Normal cruising is at 2,450 r.p.m. and at an indicated air speed of between 120 and 125 m.p.h.

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to fly a cross-country course to check the 170's ground speed. But I did get together with several men who have had the first 170s out on cross-country trips and their figures are very interesting. One man flew a 170 from Wichita to Denver at 10,000 feet. He had a head wind, he only used between 2,300 and 2,400 r.p.m., yet his ground speed averaged 117 m.p.h. On the return trip he also flew at 10,000 feet, used 2,425 r.p.m. and, because of a tail wind, averaged 143 m.p.h. His average fuel consumption for the round trip was 6.8 gallons per hour (Cessna only claims between eight and nine gallons an hour). The other pilots with whom I talked all kept careful figures on their cross-country flights and the indications are that Cessna could safely guarantee an average cruising speed of from 123 to 125 m.p.h. in still air, though their advertising only claims "over 120 m.p.h."

In a stall the 170 gives you very little warning. But it doesn't have to, because I never was quite able to make the airplane completely stall. It would just sit at about the level-flight position at 40-45 m.p.h. indicated, and mush downward. It was just as gentle in slow turns. And the landing approach, as I've said, mainly involves setting the trim tab and waiting for the airport to arrive. If you're a little short of the field you don't use the flap. If you're high you simply leave the airplane in its glide and jockey it down with the flap. The 170 is really a "Sunday driver's" airplane.

CESSNA 170

One 145-h.p. air-cooled Continental engine
Type Certificate No. 799

Wing span	36 feet
Length	25 feet
Height	6 ft. 7 in.
Gross weight	2,200 pounds
Empty weight	1,200 pounds
Wing loading	12.8 lbs./sq. ft.
Fuel capacity	37½ gallons
Maximum baggage	100 pounds
Top speed (sea level)	143 m.p.h.
Cruising speed	over 120 m.p.h.
Maximum range	500 miles
Service ceiling	15,500 feet
Rate of climb	690 f.p.m.

Source: Cessna Aircraft Company

Much of it was due to the strong wind in which I was flying, but I made some of the shortest landings in the 170 that I've ever made in any airplane. As I eased the wheel back and stalled it onto the ground, I found I could safely put on full brakes with the toe pedals. A couple of times I was stopped within the width of a crossing runway. We estimated the actual landing roll to be between 150 and 200 feet. And the take-offs were equally as surprising.

Maneuvering the 170 on the ground in that strong, gusty wind was an interesting experience in itself. That steel landing gear is, of course, the key to it all. It is nearly impossible to get into serious trouble on the ground with that gear. I taxied upwind, downwind and crosswind—slow and fast—over rough ground, yet the airplane acted as though the day was calm. And with a load in the cabin that performance is even better.

The cabin of the 170 should bring cheers from the average pilot who's been accustomed to cramped quarters. There's so much room that you can actually change seats in flight. The two front seats are mounted on rails, and when you start rolling the seats back you get the impression you're going clear into the back seat. The right front seat, as a matter of fact, rolls so far back that the person sitting in it can't reach the controls with his hands or feet. The left front seat is restricted so that, no matter where the seat might be, the pilot still can reach the controls.

The back seat is wide enough for two large people to sit comfortably, with a little elbow room to spare. And with the front seats forward in their normal position, there's plenty of leg room. There's a large door on each side of the cabin and both the front- and rear-seat occupants can get in and out easily. The baggage compartment is behind the back seat, as in the 140.

The entire interior of the 170 is practically identical with that of the 140. The instrument layout is identical. So are the control wheel, the rudder pedals—even the fuel valve, trim tab and flap handle. Result, of course, is that the 140 pilot can get right into the 170 and fly away with hardly a word of instruction.

The 170 I flew had a metal prop, which is optional equipment. The standard 170, which sells for $5,475 f.a.f., has a wooden prop, standard instruments, dual controls, fuel pump, starter, navigation lights and steerable tail wheel. The seats are quickly removable and Cessna is making a strong bid to sell this airplane to the flying farmer who wants something larger than a two-place airplane. The 170 also is equipped to take a stretcher.

The pilot who is thinking of a four-place airplane shouldn't miss the 170 before making a final decision. It is an excellent, quite conventional airplane that is comfortable, has excellent all-around visibility, is easy to fly and is quiet enough so that you can use a built-in overhead radio speaker—although the engine-noise level still is a bit high, due to the high cruising r.p.m. of the engine. But even here I'm going a bit out of my way to criticize. It's going to be difficult to find something seriously wrong with this excellent new airplane.

—Max Karant

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Return of the 'Six'

(Continued from page 30)

an American Airlines DC-6 caught fire under similar circumstances, but the pilot made a safe landing on the CAA emergency field at Gallup, N. M. Immediately after that fire all airlines operating DC-6's, with the Douglas company, jointly announced that they were voluntarily grounding the Sixes until they found the trouble and fixed it.

There were 132 changes, about half of them mandatory. All "mandatory" changes must be made before the airplanes can return to passenger carrying. The two other types of changes—"urgent" and "desirable"—can be made in the near future and at the discretion of the individual airlines.

The mandatory changes, of course, include everything that had anything to do with the two accidents. All fuel-overflow openings have been moved out to the wing tips; it was one of those vents that poured gasoline into the large air intake under the fuselage about midway between the wing's leading and trailing edges. That intake took the raw gasoline back into one of the plane's gasoline heaters, causing the two DC-6 fires. Once engineers figured out what caused the fires, they moved the overflow valves and changed the heater air intake to the leading edge of the left-wing's center section.

Other mandatory changes include such things as the replacement of certain aluminum ducts with stainless steel ducts, a completely revised fire-warning and fire-prevention system, a revised electrical system, shielded flare chutes, and the installation of a new canvas chute down which passengers can slide to the ground in an emergency once the plane is on the ground. Each DC-6 now has six inspection holes in the cabin floor, each opening into one of the plane's belly compartments. Using a portable periscope that now is standard equipment on each plane, a crew member can quickly look into any belly compartment to locate a fire exactly. The periscope enables him to inspect the entire belly compartment.

American Airlines is modifying several of its DC-6's at Tulsa, Okla. The first required 9,300 man hours; they hope to average 6,200 man hours per plane. On those planes being modified by the airlines, the Douglas company is supplying all replacements and new parts.

In addition to the mandatory changes in the fuel-transferring system, a number of modifications are being made in the cabin-supercharging system. Several pilots who had made precautionary landings with DC-6's prior to the Bryce Canyon and Gallup incidents, had reported fires in the supercharging system. Extensive modifications now have been made there too.

Unfortunately, an occurrence of this kind gives the public a distorted impression of the safety of the airplane involved, particularly after reading lurid newspaper accounts of what happened. The airlines' overall accident record still is good, with further improvement on the way. The Civil Aeronautics Board now is reported to be considering a plan to require new aircraft

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types to serve for a period of time on freight and cargo runs, in the hope that a tragedy like that at Bryce Canyon might be avoided. Such "shakedown" flying would enable the airlines to find a plane's "bugs" before it goes into passenger service, the CAB is said to feel.

Meanwhile, the Six now is back in service and is one of the most promising airliners in operation anywhere in the world. It is one of the first real "money-makers" to go into airline service. Break-even point for a DC-6 is a 62 per cent load with current costs; for a DC-3 it is 98 per cent.

A brand-new DC-6 is currently selling for $825,000, complete with radio. If that price seems excessive, note the fact that one new engine for this airplane costs $28,500 (the carburetor alone costs $850), a propeller costs $3,000 ($600 for one blade), a full set of tires (which is only good for about 2½ months) sells for about $1,000, and the standard radio equipment lists for about $10,000.

American Airlines was first to get its DC-6's back in operation. A preview press flight took newspaper and magazine aviation writers to American's modification base at Tulsa, Okla., where a number of DC-6's are currently being modified. The press plane—one of the first of the reconditioned DC-6's—hopped over to Washington, Philadelphia and New York to pick up eastern press representatives. The flight from Chicago to Washington was made in 1 hr. 40 min.—for a ground speed of 374 m.p.h. The entire flight to New York, including the stops at Washington and Philadelphia, took only 2 hr. 41 min. flying time. After the visit at Tulsa, another DC-6 flew the press party from Tulsa to Chicago in 1 hr. 52 min., averaging 310 m.p.h. All these flights were made at cruising power. END

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The Flying Smiths

(Continued from page 27)

the youngsters find it a passing fancy. All seven of them became deeply engrossed in creating a modern airpark and even dragged their dad and mother in with them.

The field now boasts a modern Skytel, complete with sleeping accommodations, restaurant, lounge, and banquet room, as well as an operations office, a fireproof repair hangar, and 34 "T" hangars, to say nothing of a flying family of 10 who can pitch in and do most any of the jobs required to operate an airport and a flying school.

Son Howard, whose background more or less unanimously makes him the director, spent the war years as a flight instructor in an Army primary school and with the Air Transport Command. At present he instructs and is a CAA designated commercial flight examiner for land and seaplane ratings.

Son Dan flies for fun and has his private certificate, but spends most of his time working at the dairy.

The girls, Virginia, Catherine, Theresa, Irene, and baby Mickey all lend a hand. Virginia has a private certificate and has done the most cross-country flying in the group. She has ferried a number of planes from both the southern and middle-western states to Washington. Catherine, an airline stewardess, also holds her private certificate and is often called upon to hold down the dispatcher's desk when she has a day at home. Theresa's flying is strictly a hobby, but she lends a hand around the field. Irene, a private pilot, is married to a former Air Forces officer, Mark Marquis, who now gives flight instruction at the field.

Mickey still attends high school, but she has surprised them all. She took to the air when she was 15 and they've hardly been able to keep her down since. She waited impatiently until her 16th birthday so she could solo, and took her private-pilot's flight test when she was seventeen. Mickey entered a high school inter-state aviation contest last spring and walked off with all the honors and a large silver trophy.

The field which Mr. Smith laments as one of his best pastures, is also a very fine 3,100-foot landing strip. It runs north-south in the flat Kent Valley area, located not far south of Seattle. With its hotel accommodations and good food the field has become a popular place for visiting pilots.

The "Skytel" is topped by an observation roof with a control tower which can be used when the traffic is unusually heavy. Also atop the roof is a battery of landing lights which can be snapped on at a moment's notice for planes which might be lost or coming in after dark.

The restaurant's banquet room is the meeting place for Kent's Lions and Kiwanis clubs. This room is also used for aviation club parties and as a ground school classroom.

The 34 "T" hangars are rented to flying clubs and individual plane owners.

Much of the operation's effort is devoted to a veteran training program. Courses offered include instrument and multi-engine. But with their location so near the Northwest's vast waterways they found many veterans wanted to become seaplane pilots. So last year the Smiths branched out, built a hangar at nearby Renton Airport, and offered both land and water instruction.

Ben Smith believes that business experience and courtesy are essential in the operation of a successful airport. Equal emphasis is placed on giving good service to all comers. END

Airmen's Aerie

(Continued from page 24)

operators there about the best method of getting in to the ranch.

This is partly due to the fact that the single N-S airstrip is a one-way affair. Landings can only be made over the river from the north, and take-offs must be made in the same direction. Early mornings or evenings are recommended for flying in or out of the ranch because during the middle of the day the air is hot, thin and turbulent. Best procedure for a newcomer is to fly over the 7,000-foot ridges with at least a couple of thousand feet for safety. When over the airstrip start a gradual spiral descent, then make a long, low approach up the river.

The runway is only 2,000 feet long and because of the timber and mountains at one end it isn't possible to climb out again if the approach is too high or fast. Usually the pilots drag their ships in on power and set them down right at the end of the strip. Landings and take-offs aren't dangerous, but they don't permit sloppy or careless flying. Plans for 1948 include additional clearing to permit two-directional use of the strip.

The airstrip is usually closed from December 1 to June 15 because of snow and generally wet conditions, and the ranch is closed along with the airstrip. Tentative 1948 hunting season dates are deer, October 1 to 20, and elk, October 25 to November 16. Fishing season is from June 15 to October 15. Airport operators at La Grande, Baker and Enterprise, will fly passengers in for $15 round trip or $10 one-way, including 50 pounds of luggage.

The ranch will accommodate 20 guests at one time, and it is necessary for them to make reservations through the reservation center, 219 Morgan Building, Portland, Ore. Rates are $10 per person per day, including meals and a well-furnished log cabin, and $12.50 per person per day including meals and the new large cabins with fireplace, hot and cold running water and flush toilets. Pack trips may be taken into the high country and lakes for $15 per day, including horses, guide, and all camping equipment and supplies. There are a minimum of four persons on a pack trip.

Once at the ranch, guests will find fishing in the Big Minam is good and even an inexperienced fly fisherman can get his limit of rainbow trout within a half mile of the ranch.

No visit to the Horse Ranch would be complete without a pack trip into the primitive reaches of the adjoining Eagle Cap

Wilderness area. This area is under control of the U. S. Forest Service and is restricted to travel on foot or horseback. Other than an occasional rustic Forest Service shelter, all the comforts one has are packed in on horses.

Such a trip requires several days, but the scenery is worth all the trouble it entails. The trail leads up steep mountain sides and over passes where there is always snow. Camps are made on the shores of high lakes surrounded by weird formations of white granite rock, with stunted evergreens adding their color to the clear blue of sky and water. Fishing is good in the lakes. Brook trout are plentiful and hungry. They rise readily to a fly and a couple of hours of evening fishing will usually produce a limit catch.

Airplanes alone have made the ranch-resort possible. It is truly a dude ranch for pilots. END

I Learned About . . .

(Continued from page 44)

everything. I did one and caught it on the horizon with stick and throttle. Then I figured I'd try one with only stick on the recovery. I pulled it up, stalled, cut the power and dumped the stick. I heard a thump and felt a jerk on the controls. The nose was very low and as I brought the stick back and shoveled some coal to the engine I seemed to be getting a lot of help on that stick. The nose came through the horizon—and I put a little forward pressure on the stick. Nothing happened. I quit using pressure and tried brute force and profanity. That was even less effective, and I yanked the throttle closed just in time to walk the rudder down from what promised to be the Granddaddy of all whipstalls.

A light flashed on in a dim recess of my mind. THE PARACHUTE! That damned parachute. I snatched a quick look over my shoulder between oscillations and verified the horrible suspicion. The shoulder straps were above the rear instrument panel. The parachute had slipped forward over the lip of the rear seat, eased from under the cinched safety belt and gone its merry way, free as the birds. It was jammed between the stick and a battery box mounted above and between the rudder pedals, holding the stick nearly full back. I waited for a down oscillation and pulled the stick a little further back, hoping to relieve the pressure and allow the chute to fall to the floor.

But the chute had landed with the stick between the rip-cord guard tube and a strap, and the pack simply slid down and jammed between the stick's base and a large British-type upright compass mounted on the floor. For a moment I toyed with the idea of oscillating the danged thing right on down to the ground. I abandoned that when I realized that I might get to zigging when the proper moment came to zag—and meet the solid ground before I reached the bottom of an arc.

I milked up the flaps, lost another precious 50 feet of altitude (which had dwindled to the hundreds) and blasted the throttle. I found that I could hold throttle, stagger up a few feet and throttle back just before stalling. Finally I struck a happy medium and set just enough power to keep above a stall. Each time I added power, the nose rose so far above the horizon that a rudder-exercise stall resulted.

After an hour and a half of juggling the throttle, walking the rudder and staggering across mile after mile of Yolo County real estate, I had worked my altitude up to 6,000. What I had in mind I'll never know. I must have relaxed my forward pressure in sheer exhaustion because about that time the chute slipped a little to one side and the stick jerked back toward the left rear corner of the cockpit. I found myself holding full right rudder and cutting the throttle before the inevitable became inevitable. I had managed during my lurching climb to stay over uninhabited areas, so at this latest turn of events I decided to hell with the plane and my half interest in it.

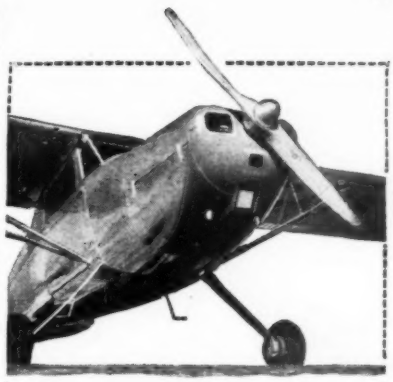
I held full rudder until I unsnapped my safety belt, then turned everything loose, got out on the wing and cut the switch. The airplane made a lousy attempt at a power-off chandelle and started wallowing around in the sloppiest spin I have ever witnessed. Meanwhile I skidded around on the wing and finally fell down with my left arm still inside the cockpit. My right shoe flew off and I watched it bounce off the horizontal stabilizer and disappear. I remember wondering whether the paddle-foot who had given me my parachute dope while I was a hero in the Air Forces had said it was Emily Post to jump outside or inside of a spin. I also remember wondering if I would bounce off the stabilizer as did my shoe.

As I flapped around in the breeze, the trip latch on the rear canopy came into range and I bashed it one. Sure enough, it came open and I slid it back until I could grab the crash bar. I worked my shoulders in, realizing I had wallowed around outside while the airplane had made a couple of turns. Hanging on with my left hand, I jerked twice on the chute with my right. The first failed, and for a split second it was a toss-up whether I would give another yank or let go and give the next yank to the rip-cord. But the next one cleared it and I dumped the stick. I figured all I had to do then was climb into the rear office and stagger home; but the dive and pull out nearly unhorsed me again and I slipped back until my elbows jammed in the angle formed by the canopy and the cockpit wall. The airplane lazily arched upward, lost speed and began falling off on a wing. I took advantage of the decreasing pressure to scramble back onto the wing and pull myself far enough inside the rear cockpit to control the wild gyrations.

Then came the job of fighting slipstream with a parachute on until I worked my way in and sat down. That chute was a lot of bother to me just then—but all the king's horses would have experienced difficulty separating me from it.

When I finally landed with that front seat empty, my shoe missing and my face the healthy color of mashed potatoes, the Capital Sky Park kibitzers had a field day.

The moral of this narrative: When you strap down a chute in the rear seat, strap a hangar pilot to it. I learned about flying from that. END



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How to Fly for $3 an Hour

(Continued from page 40)

required funds cannot be obtained in any other way. Each member who flies the plane will pay at the rate of $3 per hour.

B. CHECK FLIGHTS

Each new member must pass check flight with person designated by the club to make such checks, and must have membership card indorsed to that effect before using the plane in solo flight.

C. RESERVATIONS

Reservations for use of plane should be made in good faith, i.e.: make only such reservations as are intended to be kept. . . . Reservations for numerous regular flights should not be made more than one week in advance. However, special reservations are not limited as to advance entry.

When any reservation is not kept by 10 minutes after starting time, another member may take the plane for the remaining time.

D. OPERATION

Civil air regulations and field rules shall be followed at all times.

Members holding student certificates shall not fly solo in winds of 15 m.p.h. or above, or if winds are expected to increase to these proportions before intended flight is completed. When in doubt check weather bureau.

Any flights in winds over 20 m.p.h. are to be discouraged.

In the interest of safety, the airplane shall not be left on the line unless another member is waiting to fly it. If no one is waiting, the ship must be tied down.

A financial sheet from the club's account with Thompson Flying Service for the year 1947 at a flying charge of $3 per hour shows a net cash balance of $352.89. END

The Mail Box

(Continued from page 6)

10 per cent of personal plane owners buy new airplanes. So, Mr. Anderson's articles can justly refer to only about 10 per cent of plane owners.

So far no mention has been made of the vastly greater and more expensive headaches encountered by used plane owners who are greatly in the majority.

C. R. POWELL

East Sparta, O.

● Last year about 16,000 new airplanes were manufactured, and in 1946 over 30,000. That's half the planes flying today. Someone bought them new and we suspect Reader Powell's estimate is far too low.—ED.

NEWSPAPER HEADLINES

Here is perhaps my greatest gripe about outsiders in the flying game. The enclosed news item, with heavy type on the front page, mentions that a plane plunged into the river with Senator Taft. The picture shows the plane after it had "plunged" into the river with no damage resulting.

I suppose nothing can be done about it but I wonder, in a case of this kind, why they cannot congratulate aviation on its safety. Just think—a slight icy spot, with not even an engine failure, or even a slight sputter, might have sent a car into the ditch, or against a telephone pole resulting in hospitalization for everyone in the car, or even death.

Here, the engine failed completely and all the occupants had to do was walk a short distance in the snow.

HIRAM E. BARBER

Crete, Nebr.

● The Aviation Writers' Association—largest organization of its kind in the world—is doing much to educate the general press. —ED.

COMMENTS ON EDITORIALS

Congratulations, Mr. Ziff, on your virile and common-sense viewpoints on international hocus pocus as it exists—their application to the Air Force is secondary.

It's too bad your thoughts cannot reach a broader field.

K. B. NOBLE

New Orleans, La.

The monthly articles on national policy have disturbed me greatly. If we are going on the assumption that the way to prevent war is to prepare for war, the logic of Mr. Ziff's articles is undeniable. He rightly discards inefficient and outmoded military plans such as that outlined in the universal military program and says that true military might lies in the air. This is all true but I do not believe the way to prevent war is to prepare for war.

As a matter of faith and religion I believe that most people are inherently good and will not want to harm me if I do them no harm and treat them justly. Since nations are made up of people, I see no reason why the same belief should not apply to them.

STANLEY U. ROBINSON, JR.

Hilliards, O. END

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BEECHCRAFT Bonanza, blue trim, less than 100 hrs. Excellent condition. First $7500 Takes it.All bulletins complied with. Have purchased a Model "18". Russell Center & Co., San Antonio, Texas, P.O. Box 1521

BEECH Bonanza, perfect condition, like new, only 165 hours, will sacrifice. Write for particulars. Don White, P.O. Box 1766, Dever 1, Colorado

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BEECHCRAFT E17B-285 Jacobs, 5 pass., 10:30 since major & complete recover & rebuilt both A&E. Licensed day & night inst. cruises 165-170 on 13 Gal/hr., range 900 miles. Perfect in every respect, insurance included. Always hangared, looks & flys like new. $5950. Also BT-13A low time engine. Will accept cars or light planes in trade. D.C. Johnson, 1173 Desplaines, Des Plaines, Illinois. Phone 1023-M

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BELLANCA Cruisair: Late 1947. New demonstrator with only 38 total hours. Aeromatic propeller, outside baggage compartment, steerable tail wheel, mufflers, heaters, extra instruments, turn and bank, rate of climb, two-way radio, etc. A deluxe job throughout. Priced right for interested parties. Write, wire or phone. J.W. Stauber, Hylan Airport, Henrietta, New York. Phone: Monroe 4900

BELLANCA Cruisair. Manufactured Sept. 1947. Less than 50 hours total time. Aero-Matic Prop, 2 way radio, clock, T&B, sensitive altimeter, rate of climb, engine hour meter, two heaters. Make offer. Box 578, c/o Flying

CESSNA

CESSNA, Twin T-50. Being relicensed now, 250 hours on engines since major, control surfaces and wings recovered-constant speed props, $3450. Columbus Air-Ways, Inc., Box 1478, Columbus, Ga.

CESSNA UC-78, 5 place. Licensed day, night instruments. Executive type. Constant speed props. ADF, Flares, 185 hrs. since MOH. Heavy wing. A steal at $4000. A. A. Young, Box 571, Danville, Ill

ONE of the cleanest twin Cessnas in the United States, manufactured in 1944, deluxed job throughout, hand-rubbed berry red, orange trim with gold penstriped, cabin Fiberglas, soundproffed and upholstered in red leather, all like new. The floor is raised, battery under co-pilot seat, radio in nose, etc. Outside baggage door, extra 30 gallon gas tank, heavy wing, constant speed props with spinners. It is equipped with both heaters and ventilators in the floor of back, as well as front seat. This airplane was modified at Spartan Aero Repair at a cost of $5000. Always hangared, never damaged, in absolute tip-top condition throughout. You would have to see this airplane to fully appreciate it. It is licensed day, night and instrument until September 18, 1948. Modern Welding Company, Box 572, Owensboro Kentucky

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CESSNA 120, 1947. 30 hours Electrical System. Dual Brakes. Real buy. Make an offer. L. Nickelson, 1124 So. 4th, Springfield, Ill.

CESSNA 120 radio, heater, 50 hrs on engine licensed to Feb., 1949, $1850. Warren Johnson, Nottingham, Pa.

1947 CESSNA 120 Seaplane. Ideal for individual or flying club, for pleasure or profit at lake resorts, seashore, etc. Equipped with Edo Floats, Electric Starter, Navigation Lights, McCauley Metal Prop. Clean ship. Handles beautifully, less than 100 hours, licensed to August, 1948, $3,500. George Dressner, 86 Fort Washington Avenue, New York 32, N. Y.

CESSNA 140, landing and navigation lights, two way radio, 180 total, always hangared, $2300. L.B. Howard, Box 386, Daisetta, Texas

CESSNA Model T-50, with twin Jacobs engines recently factory rebuilt. Equipment for cross country flights includes 2-way radio. Has had excellent care, $10,000. Contact Geo. C. Kroening, 3917 N. Prospect Avenue, Milwaukee, Wisconsin

TWIN-CESSNA, heavy wing, executive interior, ADF, engines 150 SOH, $5,000, will trade for Stinson or Navion. Wilbur L. Paris, Bowman Field, Louisville, Ky.

CESSNA T-50: Deluxe conversion, recovered 6 months ago, interior by Allmon, ADF, total time since conversion 194 hrs. Price $3850. Wings Field, Inc., Ambler, Pa.

CESSNA T-50: 195 hours since major, heavy wing, 150 gallon gas capacity, relicensed July. Price $2500. Wings Field, Inc., Ambler, Pa.

1947 CESSNA 140 guaranteed to look like new. 19 hours total. Metal prop. Blind flight group, heater, Safe flight indicator, two-way radio. It cost $4000. Sensational offer, $2785. A. A. Chessmore, Atwood, Kansas

TWIN Cessna UC-78: Total time since new only 560 hours. Manufactured 1944. Deluxe job throughout. Hand-rubbed dark green finish with cream trim. Cabin Fiberglas soundprofed and upholstered in two-tone tan and brown, all like new. Floor raised, battery under co-pilot's seat, radio in nose, etc. Outside baggage door, extra 30-gal. tank, heavy wing, constant speed props. Always hangared, never damaged in any way. Privately owned and flown, and maintained in absolutely top condition. Really must be seen to be appreciated. Licensed, day, night and instrument. First cash offer over $3500, or will consider light, side by side plane, plus cash, in trade. L.W. Rittenhouse, Honeoye Falls, N. Y.

TWIN Engine Cessna 1942 model, heavy wing; (spar repairs unnecessary when converted); constant speed propellers; fully recovered wings and fuselage; seats reupholstered when converted, needs top and side wall upholstery; fully equipped for instrument day and night, flight; flourescent cockpit lighting; passing light in nose; two generators, large storage battery; baggage compartment with outside door; aircraft 1295 hours since manufactured, 481 since coverted, engines 980 hrs. since new, 255 hrs. since major overhaul; price, $3,250 net; will finance reasonable portion to responsible party; hangared near Washington, P.O. Box 38, Brentwood, Maryland

CULVER

1941 CULVER. 80 Franklin. 494:50 total 144:20 since major. Two-way radio. Excellent condition. Cruise 125 on 5 GPH. Unequaled for economical X-C, $1600. John Fickle, Coudersport, Pa.

CULVER V 119 hours. Licensed to Sept. $1695 or trade. K. Van Ausdal, 303 So. 23, Richmond, Ind.

ERCOUPE

ERCOUPE, 1946 Model 415C, Continental C-72-12 engine. Plane used very little, near new condition, $1900. Contact Geo. C. Kroening, 3917 N. Prospect Avenue Milwaukee, Wisconsin

'46 ERCOUPE 170 hrs. Perfect condition, always hangared; never cracked. All bulletins up. Starter, navigation lights, Kollsman direction indicator, turn and bank, radio, sensitive altimeter, sunshade, air temperature gauge, the cleanest ship you'll find. $2,150. Everett Holderman, Goshen, Indiana

ERCOUPE, 1946. Being relicensed now. Total time, 280 hours. Bargain at $1495. Columbus Airways, Inc., Box 1478, Columbus, Ga.

LATE 1946 Ercoupe #N C 2118H Latest Tab, Tanks, Bendix Radio Receiver, Sensitive Altimeter, Starter, Generator, Always hangared, never scratched, just relicensed ;in Nov., 1947,65 hrs. flying time. Price $2200. Herman Seavers, Hershey Air Port, Hershey, Pa.

1946 ERCOUPE: 125 hrs., two-way radio. Ship in good condition. Sacrifice for best offer around $1800. Must sell. Dr. Richard Page, 307 Quaker Road, Chappaqua, N. Y.

1946 ERCOUPE. 50 hours, relicensed. All buleitins complied with, starter, generator battery, lights, $1975. John Cunha, 26 Howe Street, Methuen, Mass.

ERCOUPE. Latest model 1946. 12 actual hours,all XC, since new. In hangar storage one year. Never damaged. Guarantee same as new. $2395. Deliver free anywhere U.S.A. J.R. Cunningham, 4538 Warwick, Kansas City, Mo.

ERCOUPE. Late 1946, total time 50 hours, always hangared, never damaged, all bulletins complied with, exceptionally clean ship, privately owned. $2000, or will accept new car in trade. Box 424, Portsmouth, N.H.

ERCOUPE, 1946, 62 hrs. total time. Always hangared. All T.O.'s complied with. Flown one hour since annual. Will trade for new Pontiac Streamliner sedanette, or sedan. Also, Ford, Chevy or Plymouth. E. W. Cook, Dover, Pa.

ERCOUPE. 130 hours since new. Radio, skis, Gyro Compass, sensitive altimeter, McCauly Prop. Just had 100 hour check. A real buy. A. Mueller, 1405 Orchard St., Des Plaines, Ill

ERCOUPE, Deluxe, 95 hours, Metal Prop, Two-way Radio, Direction Gyro, Sensitive Altimeter, cruises five miles faster than ordinary Ercoupe. Asking $2,100 J.K. King, Box 318, New Rochelle, N. Y.

ERCOUPE 1946 (stored) starter & navigation lights, less than 40 hrs. First $1500 takes it. Dr. O. R. Clovis, 336 McKinley Ave., N. Canton, O.

ERCOUPE, 1946, 70 hrs. total time. New engine installed, 10 hrs. on same, $2,350. Also, 1947 Ercoupe demonstrator, 10 hrs. $2,900. Cannot be told from new. B-C Airport, C-O York Airport, York, Pa.

ERCOUPE late 1946. In excellent condition. Always privately owned and hangared. 85 hours total time. Licensed to August '48. Never damaged. Sensitive altimeter, Clock, Starter, Generator etc., $2000. J.W. Faries, Smyrna, Delaware.

FAIRCHILD

FAIRCHILD PT-23, 185 total hours, ship completely recovered. No hours since relicense, Rawdon Hatch, two-way radio, 12 volt battery. Blind flight instruments Make me an offer. Charles Mahaffey, 427 Blackhawk St., Aurora, Ill.

FAIRCHILD 24R, 1946 model, 4-place. General Electric radio, landing lights, flares, never cracked, always hangared, 450 hours total, 100 hours since overhaul. Cost $8800 a little over a year ago. Our price $3495. Fly boys and girls here's a buy. Vest Aircraft Co., 4600 Dahlia, Denver, Colorado

PT19A PERFECT condition just relicensed always hangared. Want to trade for Cub or Aeronca. B. Cogle Jr., Thomasville, Alabama

FAIRCHILD M62A: Sliding hatch, equipped as instrument trainer including interphone system, transmitter, two receivers, manufactured in 1944. Price $1195. Wings Field, Inc., Ambler, Pa.

FAIRCHILD PT-19A, NC55405, 420 hours since major, 10 hours since relicense. Always hangared. Excellent condition. $1000. John A. Davey, 81 Berkley Street, Providence, R. I.

FAIRCHILD PT-26, 100 hours total since new. Electric starter, new generator, new tires, covered wings, special leather cushions, CO2 system, full instruments both cockpits, yellow with black stripe, inter-com, excellent condition, asking $1,859. Consider best offer or trade 1948 auto. F. H. Whaley, Box 2, Westport, Conn.

GLOBE

SWIFT 125, deluxe equipment, 167 hours, bulletins complied with, always hangared, exceptional at $2885. Rahe O. Hornung, 28 S. 7th Street, Terre Haute, Indiana

GRUMMAN

GRUMMAN Widgeon, G44A, like new, standard equipment, plus may extras, including Bendix reciver. New engines. Link Aeronautical Corp., Binghamton, N.Y

GRUMMAN Widgeon. 1030 hours 110 hours on new engines. No time since relicensing. Hangared. Included spare engines 399 and 411 hours since major. Ted Blaisdell, 1052 GroverSt., Framingham, Mass.

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HOWARD DGA 15P. 302 hours. Beautiful waxed blue and cream. Can show at fields in middle Atlantic area $3550. Ferguson, 1321 New York Ave., Cape May, N.J.

HOWARD. 37 hours since major, recover. Blue, cream trim. 2 Receivers. Complete instruments. $3395 buys. Jack Head Flying Service, 212 Ivy St., Rockmart, Ga.

HOWARD DGA-15P: If you want the finest, see this one. Low time. Completely custom equipped. John Ede, 514 E. Court, Des Moines, Iowa

JOHNSON

JOHNSON Rocket: 70 hours total, new condition 2 band Bendix radio, VHF transmitter, blind flight instruments. Hand rubbed yellow finish. A fast sportsmans airplane, with low operational. Cruises at 165 MPH. Will demonstrate. Offers considered. Edward J. Cromer, 142-34 60th Ave., Flushing, N. Y. Flushing 3-2625

LUSCOMBE

LUSCOMBE 8A bought new April '47; never wrecked, sensitive altimeter, dual brakes. Herman Johnson, McArthur, California

LUSCOMBE 8A, 65 Cont., Mfg. Aug. 1946, actual total of less than 90 hours, all X.C., Owned and flown by commercial A&E, always hangared, sveer damaged. My luscombe can hardly be told from new. $1550. Forest Rippee, 526 S.W. 29 Street, Oklahoma City, Okla. Phone 6-5404

NOORDUYN

NOORDUYN Norseman: Three, excellent,condition, low time. Hangared. Blue and yellow. $5,000 each or $13,500 for three. Traylor Aviation Company, 1707 N. Street, N. W., Washington, D.C.

NORTH AMERICAN

46 J3, CLEAN, under 200 hrs. always hangared, quick sale to best bid. Donald Duncan, Phone W62X, Clarinda, Iowa

$6500 WILL buy same as new North American Navion. Total time 60 hours. Perfect condition. All modifications completed. Complete gyro blind flying kit, Southwind heater, Defroster. Navigation, landing lights, two way radio. Always hangared. Baltes Potato Company, Scottsbluff, Nebraska

PIPER

46 J3, CLEAN, under 200 hrs., always hangared, quick sale to best bid. Donald Duncan, Phone W62X, Clarinda, Iowa

PIPER Cub 65hp. 46 model. Excellent condition. Only 20 hrs. since major overhaul. $995. cash; or trade for Swift 125, or car. Luther P. Duncan, Palmyra, Va.

'47 PIPER Crusier, 259 hrs. Excellent condition. New two position prop on ship. $2750. Jack Taggart, Twin Bridges, Montana

PIPER Cub 1948 brand new, list price less 10% discount. JE Engineering Corp., 726 Mission St., So. Pasadena, Calif.

J2 CUB licensed. Fabric, prop. etc. 1 year old. 30 hrs. since O. H.total time 520. Hangared, never cracked up. $600. Write for information. C. Milens, 42 Myers Ave., Denville, N. J.

1947 SUPER Cruiser. Total time 100 hours with Sensitive Altimeter, Manifold Pressure Gauge, Turn and Bank Indicator, 2 way Radio, Sensenich controllable and Sensenich fixed pitch props. Privately owned. Just relicensed. A-1 condition. Never damaged. Always hangared. Make an offer. No trades. M.A. Whetstone, 239 E. Division St., Kewanee, Illinois

1947 PIPER Super Cruiser. Only 70 hrs. Always hangared, like new, just relicensed. Two-way radio, $2700. James Clow, Plainfield, Ill.

CUB, 1941 J-3, 35 hours since major, privately owned, sacrifice at $595. W.C. Edwards, Jr., Eastman, Ga.

PIPER Super Cruiser. January, 1947, less than 85 hours. Gierston Tool Co., Inc., 326 E. Water Street, Elmira, N.Y.

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PORTERFIELD. For sale. Bargain. Model 35.70. Built, 1936. Total time on engine 420 hours since new. Needs some repair Unlisent. Will sell as is for $300. or will trade for motorcycle. Write Box 84,Manchester,Conn.

PORTERFIELD LP-65. Just re-licensed. New fabric. Perfect condition. $725. Ellis M. Huston, Windsor, Mo.

REPUBLIC

REPUBLIC Seabee, late model, original owner, one pilot, reversible propeller, excellent condition. $4,000. David M. Nichols, 102 W. Centre Street, Baltimore 1, Maryland, Lexington 6855

SEABEE. Serial 841. Less than 100 hours, just relicensed, complete with all latest bulletins and two-way radio. Asking $3750, but will accept best offer as must sell. H.J.R. 26 W. 47th St., New York 19, N.Y.

47 SEABEE, annual just finished, all bulletins complied with, 135 hrs., never cracked, $4250. Will deliver anywhere for expenses. Box 196, Palm Harbor, Florida

SEABEE: Serial 530 private owner, always hangared, never in salt water. Reconditioned propeller, Kollsman compass and rate of climb, 3 band radio, all bulletins complied with, excellent condition, $5000. C.T. De Puy, 634 Lexington Ave., Rochester, N.Y.

SEABEE at sacrifice, new last summer 1947, Major check recently from stem to stern. Like new with exception of flight to Florida and return. Never damaged. Deluxe equipment, cross country instrument, gyro compass, radio transmitter and receiver, wing landing lights etc. Price $5000. or highest bidder for quick deal. L.M. Bingham, Lincoln, Ill.

SEABEE: 128 hours total, excellent condition, now stored and pickled, price $3950. Wings Field, Inc., Ambler, Pa.

SEABEE #77, 150 hours total, 5 hours since relicense November, 1947. Large propeller cylinder and piston. Two way radio and cross country panel. $4800. Acadia Aviation, Inc., P.O. Box 57, Ellsworth, Maine

SEABEE: Late model, serial No. 711. NC6460K, only 90 hours total time, always hangared, excellent condition. Make offer. Harold Tracy, Brown Ave., Norwich N. Y.

SEABEE: Demonstrator, only 21 hours total time, equivalent to new, now stored and pickled. Price $4500. Wings Field, Inc., Ambler, Pa.

STINSON

STINSON 10A. Licensed till Nov., 1948. Has two-way radio, blind flight instruments, Grimes landing lights in each wing, starter, generator, flares. Tops ofwings have just been recovered and whole ship repainted. Engine has 250 hrs. since major, $1750. Ted Kyowski, East Moriches, Long Island, N.Y.

L5: GOOD condition, modified for cargo or three people. Will trade for PA-11, sheep or cattle. Harold Woosley, Buffalo, Wyoming

STINSON 150 Voyager. Late 1946 Model, 180 hours since new. Used for business trips only. Always hangared and no crashes. Has sensitive instruments and two-way GE Radio, $3800. Fisher Hardwood Lumber Company, Tuscaloosa, Alabama

STINSON L-5 handsomely painted in red and silver. Fully equipped for night flying. Electric starter. New two-way radio, tires, tail wheel, battery. In excellent condition, hangared. $1400. F. Q. Hershey, Box 58, RFD2, Rochester, Michigan. Phone 4608.

1947 VOYAGER 150, 310 hours, Aeromatic, flares, clock, all instruments, privately owned, always hangared, never damaged. Owner buying faster plane, $4250. Somerset Air Service, Inc., Bedminster, New Jersey

1957 STINSON 150; Primary group plus D.G., manifold pressure, outside baggage, two-way radio, amber polaroid and goggles, 250 total hours. Will take two Cessna 140's or Super Cruisers on even trade. Lowman Flying Service, Leesburg, Indiana

STINSON 150, 1946, complete sensitive instruments, 250 hours A&E, hangared Teterboro, New Jersey. Henry Herbert, 485 Fifth Avenue, New York, N.Y.

TAYLORCRAFT

TAYLORCRAFT, 1946 model BC 12D Deluxe, total time 78 hrs on A&E. Metalic Blue and silver, perfect condition, never scratched, wing tanks and receiver. Sacrifice for only $1500. Contact Bob Matthews, 1833 E. Dewal St., Apt. 9, Jacksonville, Florida, or Dell Popwell, c/o Florida Air Service, Herlong Field, Jacksonville, Florida

TAYLORCRAFT 2 PCLM. 560 hours. Licensed July, 1948. Turn-bank indicator. Skiis. Lights. Wind generator. New Battery. Very good condition. Will sell at sacrifice. Russell S. Bergh, Middleburgh, N.Y.

1938 TAYLORCRAFT (A-40) NC20543 recovered 10/15/46. Recent major. Hangared. $800. C. Wheeler, P.O. Box 165, Waltham 54, Mass.

VULTEE

UNLICENSED B.T. 13A, $350. For information write P.H. Norman, Route 2, Greeasboro, N.C.

SNV-1 JUST licensed nite instrument. Radio licensed, constant speed prop, all metal, 280 hours since overhaul, 1000 since new on engine. $1000. Charles W. Post, Harriman, N. Y

AIRPLANES WANTED

NEW four passenger plane by Cedar Point Enterprises. Will trade concession called Babaloo, a modern fun house. Receipts of $2,185. in summer of 1946 when constructed; and, $1,118. in summer of 1947. Gross can be greatly increased by direct management. Located in Cedar Point Amusement Park, Sandusky, Ohio. Valued at $9,000. Box 579, c/o Flying

MISCELLANEOUS

USED airplanes. Selling-out bargains. Extraordinary buys. Licensed. Privately owned. National directory, 25¢. Aero-Traders, FM, Adams, Mass.

SAILPLANE two place, Laister Kauffman LK-10B just relicensed. Post war original Yankee Doodle Two; 14 hrs. logged. Ready with trailer; many extras, $775. J.L. Brezovar, 301st M.P. Supply, Salina, Kansas

1947 STINSON Voyager 150, 1946 Aeronca Champion, 1943 Piper 100 hp Cruiser (converted AE-1), 1946 Cessna 140 for best offers. Swanson Aero Service, Sycamore Airport, Sycamore, Ill.

CERTIFIED Used Planes. Write for our detailed descriptions and prices covering several high grade two and four place used airplanes. Ready for immediate delivery. Arkansas Aviation Service, Grider Field, Pine Bluff, Arkansas. Stinson Distributors.

PARTS AND ACCESSORIES

FOR Sale: Late type Wright used engine cylinders for J540-760 or 970; less than .003 taper, $15. each or 7 for $80. Saunders Motor Company, Longview, Wash.

BT-13 HAMILTON Standard propellers, reconditioned, like new, complete. Crated, $85. Other propellers, blades, parts. Wearth Aircraft Sales, 5216 Wabash, Kansas City 4, Mo.

AIRCRAFT Phone Transmitter, Maguire ART-1, 3105 Kcs. crystal controlled, 8 watts output, total weight including built-in power supply only 10 3/4 pounds, operates on 12 volts DC. $69. each FOB. Globe Products Corp., P.O. Box 7, Bridgeport, Conn.

GE ASIB TRANSMITTER Receiver factory reconditioned. Personal Guarantee, $175. Clement Pease, 460 Beacon St., Boston, Mass.

UC-78 12.50 TIRES, brand new $6.50 each, 3 for $15. Aero Instrument Co., Municipal Airport, Houston, Texas

PHENOLIC Tubing. (spagetti), 100 feet .160 size, $2.25. Brand new BT dynamotor, 24V, $5.95; 5 for $25. Mallory noise filters, N1-1, new, dozen, $12. ADF (SCR269G or F) loop cords (with 2 PL108 plugs), dozen, $12. Aero Instrument Co., Municipal Airport, Houston, Tex.

BATTERIES - AN3151, $20 each. New dry charged, 17 Amp. hour, 24 Volt. 4 Batteries $75. packed in original box. J.W. Shelton, Box 1262, Tulsa, Oklahoma

A $200,000 INVENTORY of unused aircraft parts consisting of fuel indicators, solenoid assemblies, selector switches, hydraulic pressure switches, flap position indicators, Selsyn TJ-11 transmitters, regulating vacuum valves, etc; full price: $2,000. For description and quantitites write Box587 c/o Flying

PRATT & Whitney 450 hp Wasp R-985 owners, attention. We have almost new parts for these engines. Contact us for valves, cylinders, cases, rocker arms, pistons, rods, crankshafts, etc. Arkansas Aviation Service, Grider Field, Pine Bluff, Arkansas

TWIN-CESSNA. UC-78 & T-50 parts. New and used parts by the acres. Whatever you need to put that Gingham Bomber in tip-top shape. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla., Phone 6-2461

BEECHCRAFT. Parts. Beechcraft. Just received a carload of new and used twin-engine Beechcraft AT-11, AT-7, C-45, C-18-S, some D-18-S parts. Try us first and save time and money. We've got it. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

HOWARD. Howard, Howard. Just received two carloads of new and used Howard parts and can fill your order immediately. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

STEARMAN. Boeing, Stearman. Out of stock Stearman parts has just been swelled by several carloads. Helmet and Goggle days are here. Get that PT in the air with our parts. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

TIRES of all sizes. Huge supply of new 33", 27", 29", 12.50, 27x12, 14.50, 6.50x10, 8.50x10, and a few assorted used ones in odd sizes. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

NEW Dry-charged AN 3150, AN 3151, NAF 1062-17, batteries with quick disconnect, in original boxes ready for shipment. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

CONSTANT speed 2-B-20 and 2-D-30 propellers. -15 & -16 blades. One Curtis-Reed metal prop for Warner 145. PT-19 large hub. 2-D-30 with -12 blades for BT-13. Large number of hard-to-get light plane props. Most of these are new or zero time since overhaul. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

ASSORTED sizes of oil and fuel hoses for all engines. 24-volt Fluorescent cockpit lights. Flux-gate compass amplifiers and caging drives. Complete Magnesyn compasses. 15991-A Mall aramtures. Ignition harness and high tension leads. Ahrens controls. CO-2 2½ lb. fire bottles. Ansul-Dugas dry chemical 4 lb. Fire Extinguishers. Piper and Taylorcraft seat cushions. Cessna and Cub J-5 formed windshields. And a thousand other items. All new or like new and so-o-o-o cheap. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

R-1820-60 WRIGHT engines, new, in boxes. $650 each. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

PRATT & Whitney R-985-AN used parts, all magnafluxed and checked by Spartan Aero Repair. Southwestern Aero Exchange, 7744 E. Apache, Tulsa, Okla. Phone 6-2461

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Eight HELPFUL AIRPORTS IN MASSACHUSETTS

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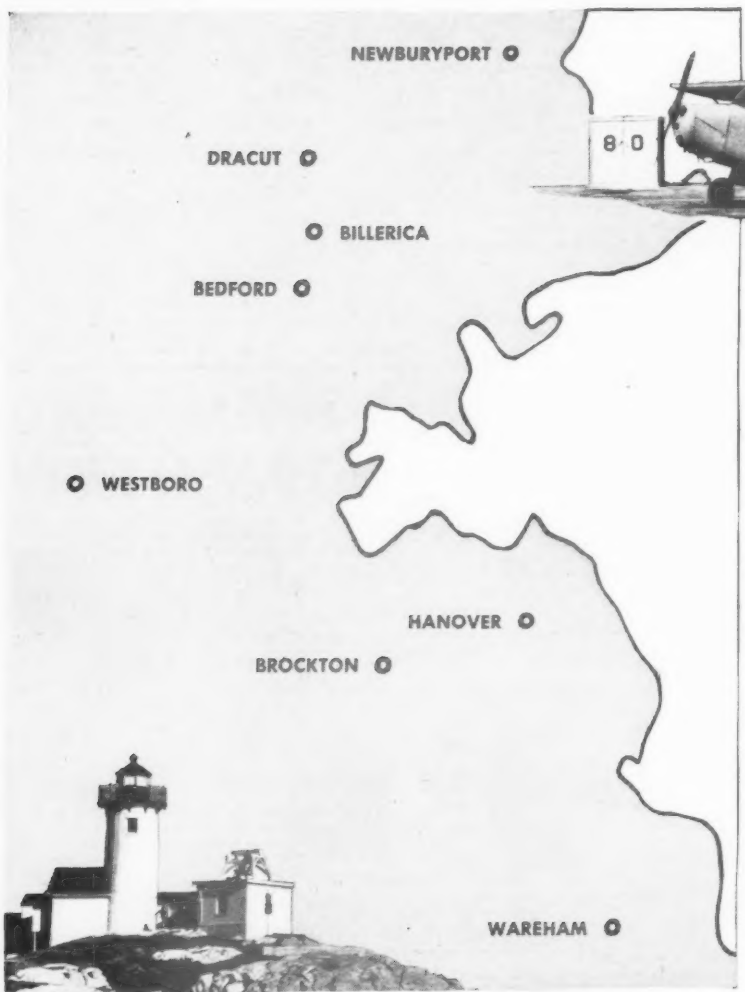
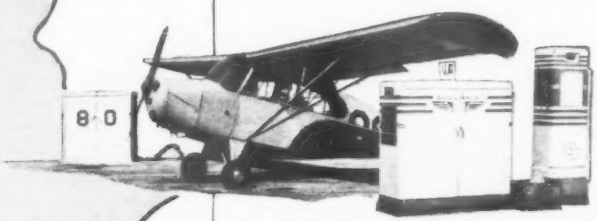
When flying or landing in Massachusetts, here is information on eight well-located airports to suit all types of aircraft. Here, too, is important news that each of these airports offers Cities Service Aviation Products and Services. Cities Service Aviation Gasolenes, Cities Service and Koolmotor Aero Oils, Trojan Aero Greases and other finest quality aviation specialties. Count on this popular sign for top notch service.





1. Newburyport, Mass.
Plum Island Flying Service—two sod runways 2,500′ and 3,000′. Maintenance & repair, hangar space, rental service, school. Near vacation center.

2. Dracut, Mass.
(2 miles from Lowell) Reebal Flying Service. Two sod runways: 2,400′ and 1,500′. Maintenance and repair, school, hangar space, restaurant.

3. Billerica, Mass.
Shawsheen Pines Airport—one 3,500′ asphalt treated runway. Maintenance, school, hangar space, restaurant, charter service.

4. Bedford, Mass.
Hanscom Airport — East Coast Aviation Corp., Atlantic Aviation Corp. and Air Holidays, Inc. Class 4 Airport with radio, beacon, lighted and paved runways. Sales and service of executive type aircraft. Hangar space, restaurant, charter service.

5. Westboro, Mass.
Lynde Flying Service—Two sod runways 1,500′ and 1,700′. Sales and service, hangar space, flight training school.

6. Hanover, Mass.
Clark Airport—three asphalt treated 2,500′ to 3,500′ runways. Maintenance, hangar space, school.

7. Brockton, Mass.
Brockton Airways, Inc. Two asphalt treated runways 2,250′ and 1,900′, both with grass extensions. Maintenance and major overhaul, hangar facilities, school, restaurant, charter service.

8. Wareham, Mass.
Cape & Island Airways. Two 3,500′ sod runways, repairs, hangar space, restaurant.

CITIES SERVICE

Cities Service Aviation Fuels and Lubricants

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, 1948

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"IT'S the biggest kick I've ever had in the air!

"Take off? Smooth as my girl back home. Then, up – quick – to see the sights. Talk about your fingertip control! The Shooting Star makes a sea gull look like a flying orange crate. Steep climbs, tight turns, sharp banks—you name them—they're yours. Just wait, you'll see what I mean when you solo in a jet job."

Many of America's most outstanding young men are having the adventure of a lifetime today with the U. S. Air Force Aviation Cadets. They're learning flying skills and techniques that will make them pioneers in the brilliant, fast-moving field of modern aviation.

If you're single, between 20 and 26½ years old, and have completed at least half the requirements for a degree from an accredited college or university (or pass an equivalent examination), you may be eligible for appointment to the Aviation Cadets. If you want to learn to fly, there's no finer training available anywhere. Ask for details at your nearest U. S. Army and U. S. Air Force Recruiting Station or Air Force Base.

U. S. ARMY AND U. S. AIR FORCE RECRUITING SERVICE

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WIN YOUR WINGS *with the* AVIATION CADETS

Pilot training classes begin in July and October, 1948. Most Air Force Bases are equipped to give complete qualifying examinations.

Swift 125 PAYS ITS OWN WAY

with Big Plane Utility . . . Light Plane Economy

FOR BUSINESS OR PLEASURE, you'll find the Swift 125 practical for fast, safe, comfortable flying. Even though you're a newly licensed pilot, the Swift 125 is easy to fly. You'll get real pleasure out of the extra power and speed of the 125 h.p. Continental engine . . . you'll fall in love with the smooth control response and stability of the modern low-wing design. You'll like the economy of operation and upkeep of this all-metal plane. Your nearby Swift Dealer invites you to fly the Swift 125. Compare it with any other plane under $6,000 . . . chances are, you'll choose the Swift.

NEW FEATURES FOR '48

Metal Top Canopy—Shades cabin from direct rays of sun. Hinges up and locks for easy entrance and exit. Now standard equipment on all models of the Swift 125.

Non-Stop Range Increased 25%—575 miles maximum cruising range with new auxiliary tank (available as accessory). New fuel venting system for extra safety.

New Cabin Window improves appearance, gives side visibility. Flat shelf behind seat for hats, log books.

SWIFT 125 SCORES *HIGH* WITH MORE UTILITY FOR LESS COST!

FEATURE	Swift 125 $3,495	Plane A $7-5,000	Plane B $8-6,000	Plane C $8-6,000
ALL-METAL CONSTRUCTION			NO	NO
LOW-WING DESIGN			NO	NO
RETRACTABLE LANDING GEAR			NO	NO
HYDRAULIC FLAPS				NO
HYDRAULIC SHOCK ABSORBERS			NO	NO
STEERABLE TAIL WHEEL				NO
SELF-STARTER AND GENERATOR				NO
AUTOMATIC PITCH PROPELLER				NO
125 HP. ENGINE, plus				NO
140 M.P.H. CRUISING SPEED, plus			NO	NO
48 M.P.H. LANDING SPEED, minus		NO		
1,000 F.P.M. RATE OF CLIMB		NO	NO	NO
425 MILE RANGE, plus				NO
SCORE	ALL	11	7	1

$3,495 STANDARD 125 hp. Flyaway Dallas. Deluxe Equipment listed in this ad about $500 extra, installed. IMMEDIATE DELIVERY.

- Standard Instruments
- Hydraulic Flaps
- Retractable Landing Gear
- Hydraulic Shock Absorbers
- Self-starter and Generator
- Parking Brake
- Steerable Tail Wheel
- Metal Top Canopy
- Navigation Lights
- Cabin Heater
- Dual Controls
- Lighted Compass (deluxe models)
- Aeromatic* Propeller (deluxe models)
- Two-Way GE Radio (deluxe models)

*Reg Trade Mark

Texas Engineering & Mfg. Co.

P. O. Box 6191-F **Dallas, Texas**

OTHER TEMCO PRODUCTS: U. S. and foreign governments and airlines use our facilities for aircraft modification, conversion, and overhaul in important volume. General products include vending machines, Coca-Cola truck bodies, metal cabinets, and parts for many products.

Swift 125